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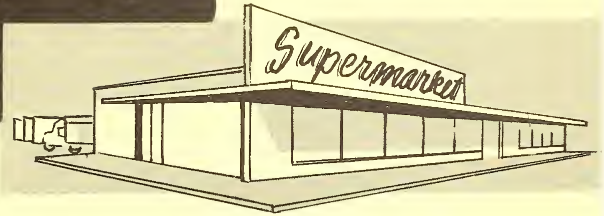
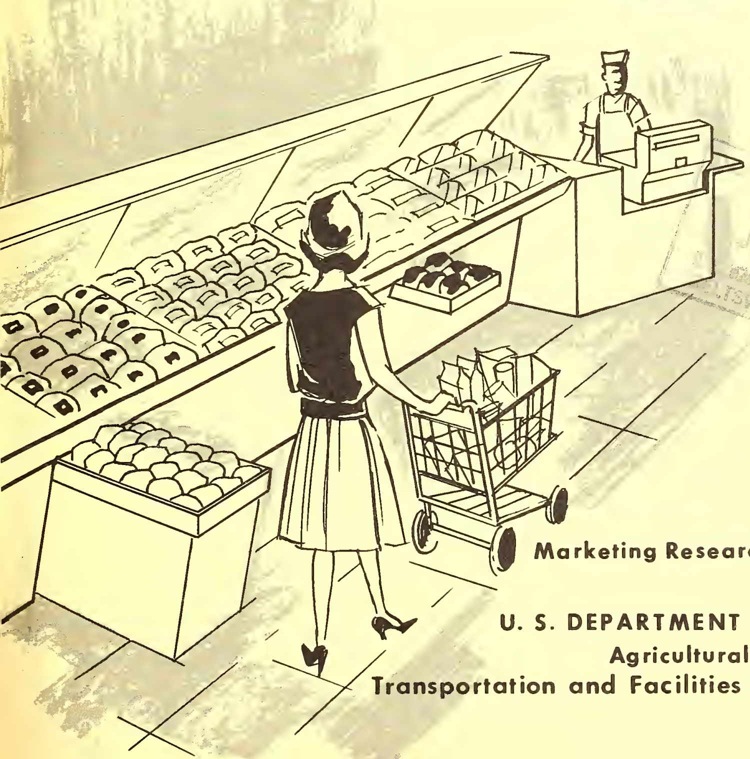
DISPLAY LOCATION and CUSTOMER SERVICE in Retail Produce Departments





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Marketing Research Report No. 501

U. S. DEPARTMENT OF AGRICULTURE
Agricultural Marketing Service
Transportation and Facilities Research Division

PREFACE

The study reported here dealt with the location and layout of the produce sales area, and the weighing and price-marking of produce in bulk-type departments of retail food stores. It is part of a broad program of research aimed at holding down the costs of marketing farm products and increasing the efficiency of food wholesaling and retailing.

Most supermarkets have reported that, during the past several years, produce sales have been a decreasing percentage of total store sales. The layouts and improved operations described in this report should aid in reducing the handling costs and increasing the movement of fresh produce. Fresh produce normally returns a higher portion of its retail selling price to the farmer than canned or frozen foods. A reduction of fresh produce selling costs may potentially increase sales and subsequently increase the farmer's share of the consumer's dollar.

Increases in marketing costs are normally reflected back to the farmer in lower returns or to the consumer in higher prices, or both, as competition among traders gradually adjusts costs and margins. Reduction of costs, therefore, can benefit all interested groups--producers, processors, distributors, and consumers.

The study was under the general supervision of R. W. Hoecker, chief, Wholesaling and Retailing Research Branch, Agricultural Marketing Service. The Penn Fruit Company and Food Fair Stores, Inc., of Philadelphia, Pa.; Red Owl Stores, Inc., Hopkins, Minn.; Safeway Stores, Inc., Washington, D. C.; Eaveys Town and Country Supermarket, Columbus, Ohio; King Supermarkets, Irvington, N. J.; Von's, Los Angeles, Calif.; and other firms contributed the use of their stores in conducting tests. Many Federal-State Extension Service employees contributed to the data.

Growth Through Agricultural Progress

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Washington, D. C. October 1961

DISPLAY LOCATION AND CUSTOMER SERVICE IN RETAIL PRODUCE DEPARTMENTS

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SUMMARY

Improved equipment and methods for the customer service operation of two produce departments resulted in labor savings of 20 to 45 percent compared with usual customer service methods. In addition, produce weighing at the checkout counter by improved methods was found to cost only one-fourth as much as an efficient customer service station. Rearrangement of the display area of five produce departments resulted in an increase in percentage of produce sales to total store sales. This represented an increase in the proportion of produce sales of 13 to 21 percent. This report presents principles of layout for produce department display and customer service areas.

The objectives of the study reported here were to measure the effectiveness of different produce department sales area layouts through a technique known as customer traffic studies, and to evaluate methods of weighing produce for bulk-type produce departments. Over 7,000 customer traffic patterns in 35 stores were analyzed. Store layouts were altered or incorporated in new stores and evaluated by observations and operating records. Motion and time studies were made of about 10,000 customer orders in 20 stores.

Customers took longer, per dollar spent, to shop the produce department than the average of all other departments. The number of items purchased per customer was higher by about one-third in the late part of the week than on Monday, Tuesday, or Wednesday. Customers shopping bulk displays took longer than customers shopping prepriced unitized produce. A limited series of studies indicates that sales per customer were less when there was considerable congestion in the department than when the customers had freedom of movement. Aisle widths found to be adequate to prevent most congestion were 7½ feet for a $3,500-a-week produce department and 10 to 11½ feet for a $7,000-a-week department.

Produce departments located first in the store traffic pattern had an average of 10.0 percent of store sales compared with an average of 8.9 percent for stores with the produce departments located last in the shopping pattern. This represents 12.4 percent higher produce sales for departments located first. Produce departments located first also had the highest percentage of customers who shopped produce and the highest percentage of customers who bought produce.

Straight-line produce departments, with all produce on both sides of one aisle, showed a higher percent of customers shopping and more thorough shoppin

of the department than more open, multiple-aisle produce layouts. The percent of store sales for produce increased for five stores that converted from multiple islands to straight single-aisle departments.

Produce displayed on secondary aisles sold less as a percentage of total produce sales than the same produce items displayed on the major aisle. End displays in produce departments were only 55 percent as effective per front foot as displays on the major aisle.

Placing extensions from the counter in alternating positions in long single-aisle departments was the most favorable arrangement tested for sales results. These extensions gave a 16 percent greater number of sales than the next best method tested.

Improved customer service stations for weighing bulk produce in the produce department saved 20 to 45 percent of the clerk's time in two stores. The improved stations were placed at the end of the customers' produce shopping pattern, with the scale adjacent to the aisle and angled in such a way as to be most convenient for the customer. A small shelf was provided to hold packages, and the equipment was arranged so as to reduce motion in handling the packages. Work space for odd jobs was provided in order to make most effective use of the clerk's time.

Weighing and pricing produce at the checkout increased checkout labor 3 to 6 percent, for five different types of checkout counters, over the labor when produce was not weighed there. For a $35,000-a-week store, checkout pricing of produce increased the labor required for checkout by 5 to 14 hours per week. This compares with 41 to 45 hours per week required for weighing at improved customer service stations in the produce department.

Principles developed to maximize sales and minimize costs for produce department display area layout are:

1. Locate produce first in the shopping pattern.
2. Design the department to encourage one-direction traffic.
3. Avoid secondary aisles and produce end displays.
4. Keep displays back from entrances and exits.
5. Provide an aisle wide enough to handle average peak periods.
6. Encourage "bounce" traffic (shopping both sides of an aisle alternately).
7. Use specials to pull customers to "dead" areas.
8. Arrange displays to encourage complete shopping of the department.
9. Locate backrooms close to sales areas with a minimum of "cross traffic."

10. Locate service station (if used) at the end of the produce shopping route.
11. Locate the customer service station so the customer will not block either an aisle or a display.

Principles for the development of improved customer service stations are:

1. Provide for a fixed workplace with the scale in one location.
2. Eliminate barriers between customers and scale.
3. Provide a shelf beside the scale to hold packages.
4. Provide a work surface and scale platter at a convenient height.
5. Locate tools, materials, and necessary equipment close to or directly in front of the operator.
6. Provide a workspace for odd jobs.

Principles for the development of effective checkout counters for weighing produce are:

1. Locate a low-platform scale at working level.
2. Locate this scale so it does not interfere with regular ring-up operation.
3. Use a scale which has an easily read dial.
4. Provide a supply of small bags for bagging produce items.
5. Provide adequate price-chart information.
6. Use a register which eliminates presorting.

OBJECTIVES AND METHODS

The layout of the produce display areas in retail food stores and the procedures for weighing and price-marking produce may have significant effects on operating costs and sales volume. The retail produce department constitutes from 8 to 12 percent of the dollar sales of retail supermarkets and operates with a gross profit of approximately 25 percent.

The objectives of the study on which this report is based were: (1) To measure the effectiveness of different layouts of the produce display area and to develop improvements; (2) to evaluate different types and locations of customer service stations and to develop improved methods for them; and (3) to evaluate produce weighing as performed at different types of checkout counters.

Sales, shopping time, completeness of shopping, and congestion were determined by customer shopping pattern studies; labor costs were determined by clerk travel studies and time studies. New store layouts were designed and installed or markets were remodeled. Comparisons of store operating records, customer traffic studies, and time studies were again made to evaluate the effectiveness of the installations.

Detailed, accurate, and controlled analysis of department layout can be attained through a technique known as "customer traffic studies." This type of analysis makes possible an evaluation of the layout of a department more quickly and accurately than comparison of sales results of stores of different designs and is particularly effective with regard to details of layout within a department. This technique, as developed by the researchers, is based on charting traffic patterns of a random sample of customers. The path the customer followed was traced on a layout sheet of the department, and each item purchased and the time spent in the department was noted. At the end of each observation period, customer paths were transferred from the individual sheets to a master layout. Shopping patterns were taken in the produce departments of 35 stores. Improvements were made in many stores and additional patterns taken to evaluate the layouts. In all, over 7,000 customer patterns were obtained and analyzed. Traffic patterns of additional stores, developed by other research workers, also were analyzed in establishing the principles given in this report.

Weighing and price-marking the bag of produce in the display area is referred to in this report as the "customer service" function.1/ This function includes all the related work or delays from the time the customer gives the item to the clerk until it is returned to the customer. The customer service function occurs only when there is a customer shopping in the produce department; therefore, other jobs are added to the clerk's duties to utilize the idle periods. These jobs are not charged to customer service. When produce is weighed at the checkout counter, the function is simply "weighing."

Time studies to evaluate the weighing and price-marking function were made of approximately 10,000 orders in 20 stores of 6 retail food chains in different parts of the country. Motion pictures were used to analyze those elements which were of too short duration for time study.

SOME CUSTOMER SHOPPING CHARACTERISTICS AFFECTING LAYOUT AND SERVICE

Several customer shopping characteristics which materially affect the display and service operations of retail food stores should be considered when laying out or remodeling a store.

1/ Produce departments in which a substantial part of the produce is displayed unpackaged and is weighed at a customer service station in the produce display area or at the checkout counter are commonly referred to as "bulk-type" departments.

Average Shopping Time and Number of Items Purchased by Day of Week

Studies in five supermarkets with annual sales of 1.5 to 4 million dollars showed that produce shoppers [2] spent an average of about 3 minutes in the produce department during the early part of the week and about 3½ minutes on Friday and Saturday (table 1). They spent from 16 to 25 percent of their total shopping time in the produce department and, since the percentage of total sales represented by produce in these stores was 9 percent, the customers spent more time per dollar for each produce purchase than the average for all items. The additional time spent in this department should be taken into account in providing aisle space.

Table 1.--Average shopping time, number of purchases per shopper, and relative produce sales, by days of week, in 5 supermarkets

Day	Customers observed	Customers buying produce	Produce purchases 1/	Time spent in produce department	Proportion of week's produce sales 2/
	Number	Percent	Number	Minutes	Percent
Monday....	443	59.8	2.1	2.8	7.0
Tuesday...	578	64.0	2.1	3.0	10.0
Wednesday.	622	66.1	2.2	2.9	9.4
Thursday..	608	68.4	2.4	3.1	20.0
Friday....	653	72.2	2.9	3.6	30.2
Saturday..	386	72.1	2.8	3.4	23.4
					100.0

1/ Purchases and time represent averages for those customers entering produce department.

2/ Average of 3 stores.

The average number of produce purchases [3] per customer entering the produce department increased from 2.1 during the first part of the week to 2.9 on Friday and 2.8 on Saturday (table 1). At the same time, the percentage of customers entering the store who bought produce increased from 60 percent on Monday to 72 percent on Friday and Saturday. Thus the increase in produce sales during the last of the week over the first was due to a larger percentage of customers purchasing produce, to increased amounts of produce purchased, and to a higher customer count in the department. Studies in one store indicated the variation in number of purchases per customer according to time of day. In this store, the highest sales per customer were in the midmorning, with a gradual decline the rest of the day regardless of the day of the week. This pattern was consistent with those taken at less frequent intervals in five other stores.

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[2] A produce shopper was recorded as any customer who entered the produce department. A customer is anyone entering the store. Both can consist of more than one person, as in the case of a family.

[3] A produce purchase was recorded when the customer took merchandise from any display, regardless of the number of units selected.

Average Shopping Time, Bulk vs. Prepackaged

Shoppers in self-service stores spent less time per purchase than shoppers in bulk departments (table 2). When produce was displayed both bulk and packaged, shoppers took even longer than for bulk displays.

Table 2.--Average time per produce purchase in bulk and prepackage departments

Store	Bulk		Prepackaged	
	Customers	Average time per item purchased	Customers	Average time per item purchased
	Number	Minutes	Number	Minutes
Store A...........	240	1.28	239	1.09
Store B...........	283	1.35	314	1.07

Congestion

Limited studies in two produce departments using the bulk method of display showed sales per customer were less when the department was congested (table 3). Congestion was defined as enough people in the department to restrict the movement of the customer toward the produce counters. A determining factor was when several people were forced to stop and wait.

Table 3.--Effect of congestion on purchases per customer in the produce departments of 2 supermarkets

Periods	Average number of purchases	
	Store A	Store B
	Number	Number
Not congested..........................	2.38	3.88
Congested..............................	2.04	2.96

If an operator desires to reduce congestion, aisles must be adequate to handle peak customer volume. Adequate space was found to be 15 to 25 square feet per customer with a shopping cart, multiplied by the average number of customers in the department during peak periods. Sales during peak periods in test stores were about 3 to 3½ times the weekly average.[4]

As an example, one $5,000-a-week produce department allowed space for a peak capacity for shopping of about 18 customer groups with shopping carts

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[4] Weekly dollar sales divided by the hours the store was open.

(or 25 people) in the department. Aisles should be adequate to hold the customers and still permit free movement within the department. An allowance should also be provided for clerks with stocking carts for maintenance of displays. Aisle widths in single-aisle departments that were found adequate for the average store are $7\frac{1}{2}$ feet in a $3,500 department and 10 to $11\frac{1}{2}$ feet in a $7,000 department.

LOCATION AND ARRANGEMENT OF PRODUCE DEPARTMENT

The location of the produce department in the store and the arrangement of its display fixtures may determine, in part, the success of the department, and care, therefore, should be used in the initial planning.

Position of Produce Department in Store Traffic Pattern

The location of the produce department within a store is subject to considerable differences of opinion between firms, but is usually consistent within the firm and to a great extent within a region. The department is most commonly located so that it is either the first department to be entered by a customer or the last department the customer shops before checking out; however, some locate it midway in the shopping route. The effect on produce sales, in relation to total sales, of locating the department first, as opposed to locating it last, was measured in seven pairs of midwestern stores with comparable volumes and locations.

As shown in table 4, produce sales represented 10.0 percent of one year's total sales in the seven stores with produce departments first in the shopping route, compared to 8.9 percent in seven stores with the produce departments last. Assuming equal total store sales, this represents a difference in produce sales of 12.4 percent in favor or those stores with produce departments first. Gross profit on produce, as a percent of sales, was practically the same in both groups of stores.

Table 4.--Produce as a percentage of annual store sales in 7 pairs of stores with produce first and produce last in the shopping patterns, in 1 midwestern chain

Pair	Produce percentage of store sales	
	Produce first	Produce last
	Percent	Percent
A.	8.8	8.3
B.	10.7	9.2
C.	11.4	9.6
D.	11.4	9.6
E.	10.0	9.2
F.	1/ 8.9	1/ 8.7
G.	1/ 9.0	1/ 7.6
Average.	10.0	8.9

1/ New stores, data for last 6 months only. Stores were opened at least 3 months before data were kept.

Further analysis for three stores having different locations for the produce departments indicates, as shown in table 5, that when the department is first, a higher percentage (90 percent) of customers enter the department than when this department is last (76 percent). In the stores observed, there was also a substantially higher percentage (71 percent) of the customers that made purchases in the produce-first department than the percentage (46 percent) that made purchases in the produce-last department. The produce-last department tends to lose customers to secondary aisles as a shortcut to the checkouts. The produce department that was located in the back of the store at an intermediate position had a lower percentage of customers shopping the department (81 percent) than the store where it was located first.

Table 5.--Comparison of shopping habits of customers in 3 stores with produce departments first, last, and in an intermediate position

Activity	Produce first, store A	Produce last, store B	Produce intermediate, store C
	Percent	Percent	Percent
Customers entering produce department........	90.2	76.1	81.2
Customers purchasing produce....................	70.8	45.7	53.5
Shoppers returning to produce...................	6.7	4.2	15.3

Further corroborating the findings shown in tables 4 and 5 were data from two supermarkets with two entrances. These allowed the customers to begin shopping on opposite sides of the store so that mixed shopping patterns developed with customers moving in several directions. Produce as a percentage of store sales was highest for those customers entering the door which exposed them to produce first (table 6).

Table 6.--Produce sales as a percentage of total sales for customers entering each door of 2 double-entrance stores

Entered door giving:	Store A	Store B
	Percent	Percent
Exposure to produce first..	10.3	14.6
Exposure to produce last...	9.1	12.4

The conclusion may be drawn that placing the produce department first in the store will get it a larger percentage of the dollar spent.[5] Other departments of the store were not analyzed as to location.

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[5] It should be emphasized that these findings are reported as percentages of total dollar sales per store and not as number of purchases as reported in "Customer Shopping Patterns in Retail Food Stores," AMS-400, Agr. Mktg. Serv., U. S. Dept. Agr.

Location and Type of Display Counters

Studies indicate that customer shopping patterns change with the shape of the produce department. The location, arrangement and width of aisles, and accessibility of displays are all factors which seem to influence the patterns of customer shopping, and therefore the sales.

Five stores are described to illustrate some of the different types of gondola arrangements in common use and their resulting customer traffic patterns. One pattern occurs with produce displays on both sides of an aisle. As the customer passes through the aisle, she tends to shop each counter alternately. This results in a "bounce" pattern, and occurs most often in a department with produce displayed on both sides of a straight aisle, referred to in this report as a straight-line department. Stores A and B represent two common types of straight-line departments (figs. 1 and 2). Store A has an "escape" opening in the center of the gondola on the customer's left. Store B has a display of onions and potatoes down one side of a secondary aisle. The "bounce" pattern of customers is shown in the lines representing paths of customers moving from one side of the aisle to the other as they pass through the departments.

Store C is somewhat similar to stores A and B, except the long aisle is turned 90° to make an L-shaped aisle (fig. 3). The bounce pattern is apparent as shown in the cross lines in both parts of the major aisle.

Store D represents a less well defined department, with several aisles surrounding gondolas (fig. 4). The bounce pattern of shopping is found only in the two center aisles, primarily between the wet rack and the vegetable counter.

Store E is similar to store A, except that, instead of a long gondola opposite the wall display, numerous small tables are used with many aisles and passageways for customers to enter (fig. 5). Very little bounce shopping is noted, even on the main aisle.

Each of these departments is near the entrance of the store and is entered by most customers before other departments. The percentages of produce shoppers purchasing from the various display gondolas are shown in each figure. In the straight-line departments, 50 to 60 percent of the shoppers bought from major displays on each side of the main aisle (figs. 1, 2, and 3). Relatively few shoppers bought from the individual tables and gondolas in stores D and E (figs. 4 and 5). Of these displays, the wet rack in store D and the banana display in store E were heaviest shopped, about a fourth of the shoppers purchasing from each.

The largest percentages of the stores' customers entered the produce departments that were arranged in a straight line (table 7). In these five stores, the percentages of customers who shopped the entire produce department varied from 77 percent in the single-aisle department to 25 percent in the stores with secondary aisles and to less than 10 percent in the departments with many islands and aisles. It was noted also that shopping time was less in the stores with many aisles.

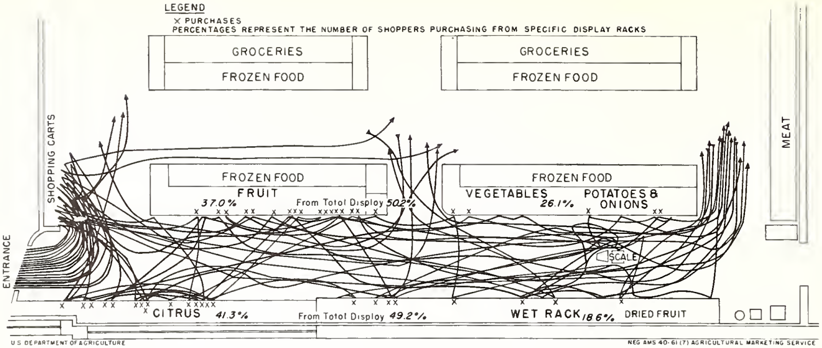


Figure 1.--Customer traffic and percentages of shoppers purchasing from various displays in store A, a straight-line produce department with a split gondola and no secondary aisle.

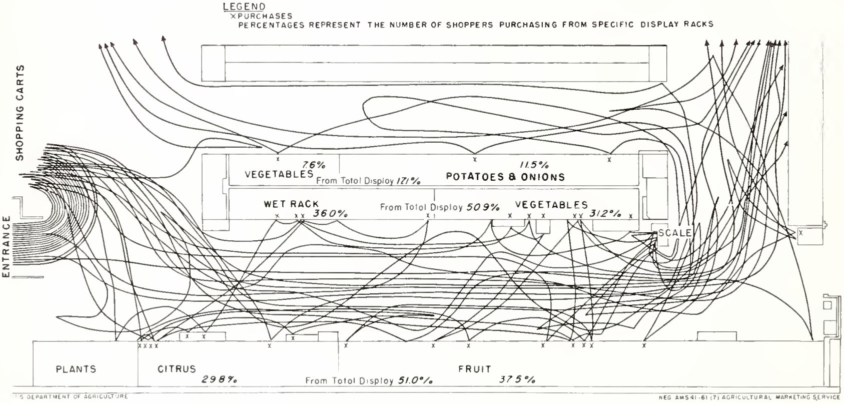


Figure 2.--Customer traffic and percentages of shoppers purchasing from various displays in store B, a straight-line produce department with a secondary aisle.

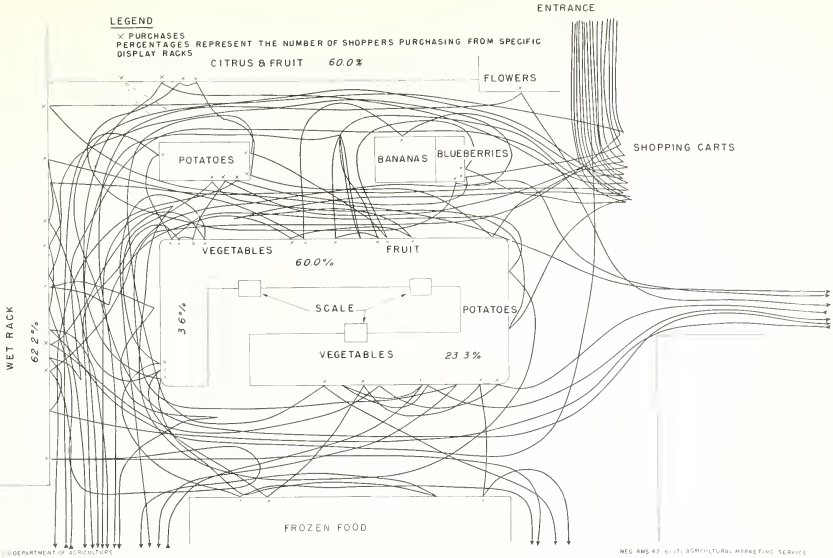


Figure 3.--Customer traffic and percentages of shoppers purchasing from various displays in store C, a corner L-shaped produce department with a secondary aisle.

Table 7.--Customer traffic in 5 differently arranged produce departments

Store	Percentage of customers shopping produce department	Percentage of produce shoppers who shop whole dept.	Customers observed
	Percent	Percent	Number
A--Straight line with split gondola.........	1/ 87.9	76.9	672
B--Straight line with secondary aisle.......	90.2	25.2	1,072
C--Corner L-shaped with secondary aisle.......	-	21.1	297
D--Three gondolas........	81.2	7.5	600
E--Wall counter and individual tables.....	78.3	5.6	129

1/ Some customers passed through checkout lanes to enter the sales area as they entered this store.

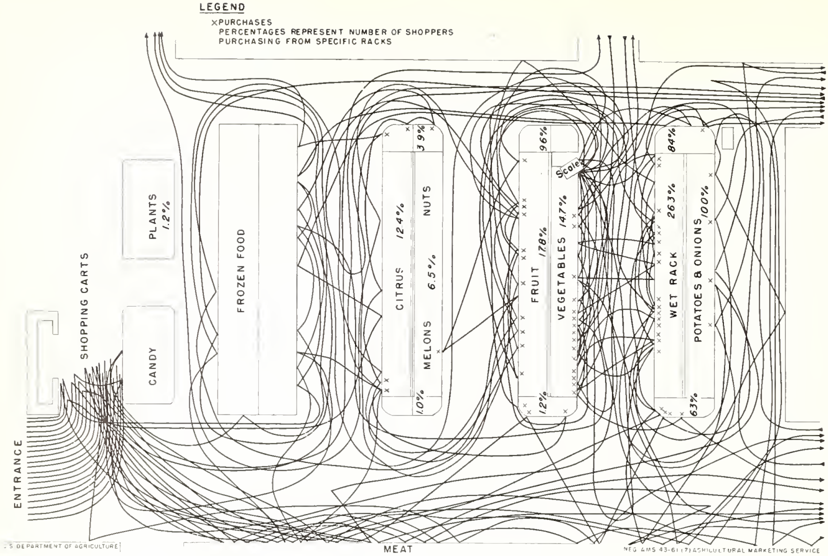
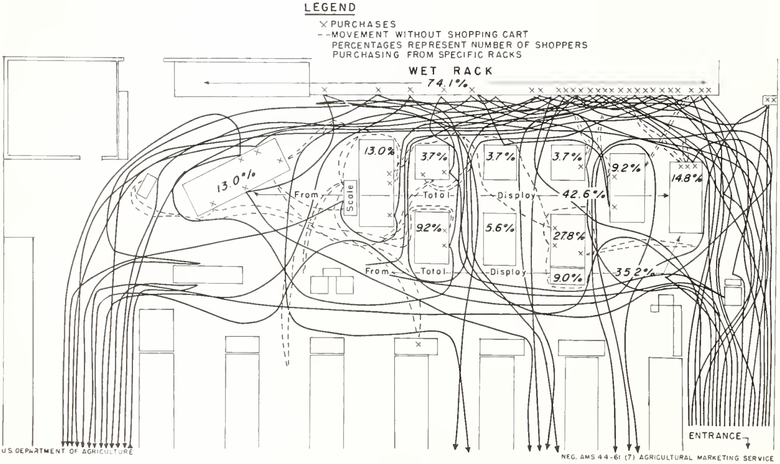


Figure 4.--Customer traffic and percentages of shoppers purchasing produce from various displays in store D, a gondola type produce department.


LEGEND
× PURCHASES
--MOVEMENT WITHOUT SHOPPING CART
PERCENTAGES REPRESENT NUMBER OF SHOPPERS PURCHASING FROM SPECIFIC RACKS
WET RACK
74.1%
13.0%
13.0%
Scale
From
3.7%
Total
3.7%
Display
3.7%
42.6%
9.2%
14.8%
9.2%
5.6%
27.8%
From
Total
Display
9.0%
35.2%
ENTRANCE
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NEG. AMS 44-61 (7) AGRICULTURAL MARKETING SERVICE

Figure 5.--Customer traffic and percentages of shoppers purchasing from various displays in store E, a wall rack produce department with individual tables in the aisles.

To test the concept of long, narrow produce departments with continuous produce displays on both sides of a single aisle, several stores which previously had a series of multiple dump tables in a large open area adjacent to a one-wall produce display were converted to the long, narrow department (similar to that in store E). A single cross aisle was provided at the beginning in most of these stores, so that customers did not have to shop the produce department first, but the obvious normal entry to the store was through the produce aisle.

Reports from five firms where operating results were collected show increases in the percentage of produce sales to total store sales. Since total store sales remained the same or increased in each case, this represents an increase in proportion of produce sales of 13 to 21 percent (table 8).

Table 8.--Percentages of store sales for produce departments before and after rearrangement of produce sales area layouts, 5 retail stores

Store	Multiple table arrangement	Single aisle rearrangement	Increase
	Produce percent of store sales	Produce percent of store sales	Percent
A..........	10.7	12.9	20.6
B..........	7.6	8.9	17.1
C..........	7.8	8.8	12.8
D..........	6.8	8.2	20.6
E..........	6.6	7.8	18.2
Average.....	7.9	9.3	--

Secondary Aisles

In addition to displays on both sides of a main aisle, produce was displayed often on an adjacent secondary aisle. The commodities in these secondary aisles were primarily potatoes and onions, which are generally considered "demand" items (items that customers have planned in advance to buy). Secondary aisles limit the possibility of impulse sales, because most customers enter these aisles only when they have specific items to purchase.

The relative effectiveness of a main aisle location compared to a secondary aisle location for such demand items as potatoes and onions was measured for 4 months in nine pairs of stores of one firm. Nine stores with potatoes and onions on main aisles sold 11 percent more potatoes and 6.2 percent more onions, by weight, than nine comparable stores with these items in secondary aisles (table 9). Display size was equal in each case.

Table 9.--Comparative movement in 1 firm of potatoes and onions in 9 stores with main shopping aisle displays and in 9 stores with secondary aisle displays 1/

Store pair	Main aisle display		Secondary aisle display	
	Proportion of total pounds of produce shipped to store		Proportion of total pounds of produce shipped to store	
	Potatoes	Onions	Potatoes	Onions
	Percent	Percent	Percent	Percent
1............	19.0	5.6	16.9	5.4
2............	20.0	4.6	17.9	4.9
3............	22.4	4.9	23.8	3.9
4............	21.4	5.0	17.9	4.5
5............	29.9	6.0	24.7	4.8
6............	22.3	5.2	19.0	5.0
7............	27.8	4.8	29.0	5.1
8............	27.1	5.1	24.6	4.9
9............	23.0	4.6	18.0	4.9
Average.......	23.7	5.1	21.3	4.8
Increase......	11.3	6.2	-	-

1/ Measured in percentage of total weight of produce shipped to each store.

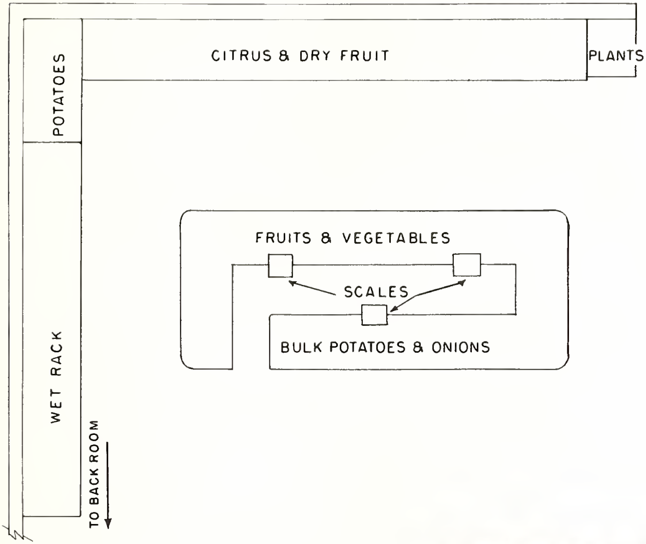
Location of Customer Service Stations

A principal factor in the efficiency of a customer service station is its location in the produce department. Traffic studies show that a single station with a single scale, strategically located, is more efficient than several scales at several locations in the department. Studies were made in stores where several service stations were located at different points in the produce department. In one type of installation, the scales were mounted behind the displays and a walkway was provided for the service personnel (fig. 6). The customer selected the item and brought it to the nearest weighing location. The produce clerk then walked to the scale and weighed and price-marked the item. Where the scale was behind the displays, the customer often blocked the displays from other customers while the clerk weighed the package. A clerk travel study made in one such store showed a total of over a thousand trips a day by the service clerks in moving from displays to customers and from scale to scale (fig. 7). This amounted to over 10 miles a week of unnecessary walking.

Similar studies of clerk travel in stores of comparable sales volume with one fixed customer service station showed travel to be approximately one-half hour a week. The tendency for the customer to use the nearest scale was noted in stores with several produce weighing scales in the aisle. Figure 8 shows the clerk travel between the scales in a store with two scales in the aisle.

There was an excessive amount of backtracking and cross traffic in this department; since much of the produce to be weighed was in the display area beyond the scales, customers had to return to the scales to have those produce items weighed.

When scales were located at several places in the department, the customers often took each package to a scale for weighing as it was selected. This required more clerk time, due to the extra handlings, than when the customer brought several items at a time.



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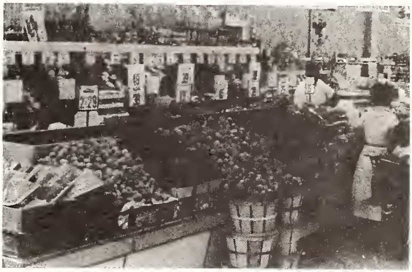

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Figure 6.--Island-type customer service counter with walkway for clerk to serve customers at either of three scales.

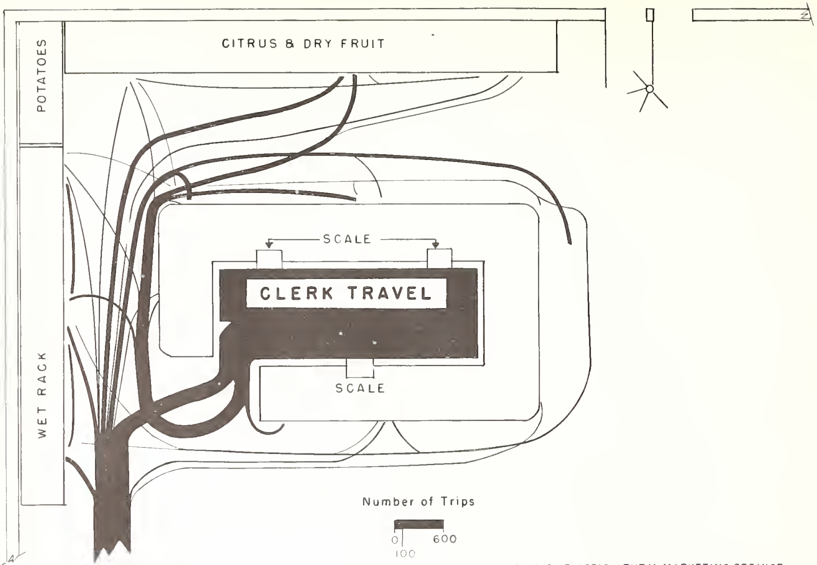

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Figure 7.--Clerk travel for the customer service function with stations located at three points in an open-island type of produce display fixture.

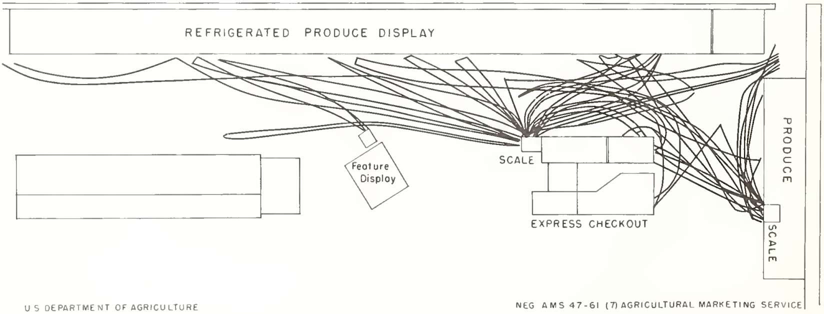

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Figure 8.--Clerk travel per 100 customers for the customer service function with scales located at two points on the produce aisle.

ARRANGEMENT OF PRODUCE DISPLAYS

The positioning of individual product displays and the location of special displays also have considerable effect on the traffic pattern created in a retail produce department.

Location of Produce on the Counter

Relocating individual displays so that "demand" items are scattered throughout the department, among more profitable or slower moving items, has been used by merchandisers for many years as an effective way of increasing sales. This principle applies as well to locating produce items.

Figure 9A shows a department with a poor product arrangement for maximizing sales. 6/ Fast selling items were grouped together and slow movers together. As a result, the customers tended to congregate and totally miss a large part of the department.

In the improved display arrangement (fig. 9B), the customer shopping pattern was more even, with plenty of bounce shopping. This was the result of spreading the high-volume items about the department. A "price special" item was located in place of the pumpkin display to start customers shopping early in the department. Display widths were adjusted in relation to item sales, and bags were distributed throughout the department. There was a considerable sales increase in this department after the changeover.

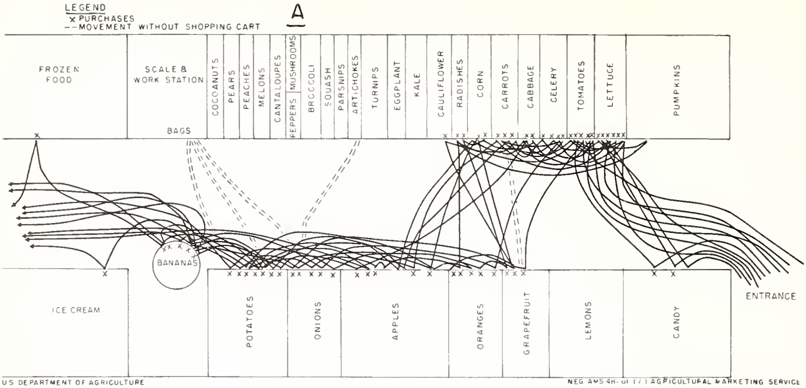
End Displays

End displays are those that are built on the end of a produce gondola. The gondolas along the wall are usually continuous and seldom offer opportunities for end displays. Some of the larger departments have their gondolas divided with cross aisles into two or more lengths, in order to give customers more ready access to the other side. These are referred to as split or multiple gondolas, and they have several ends available for displays.

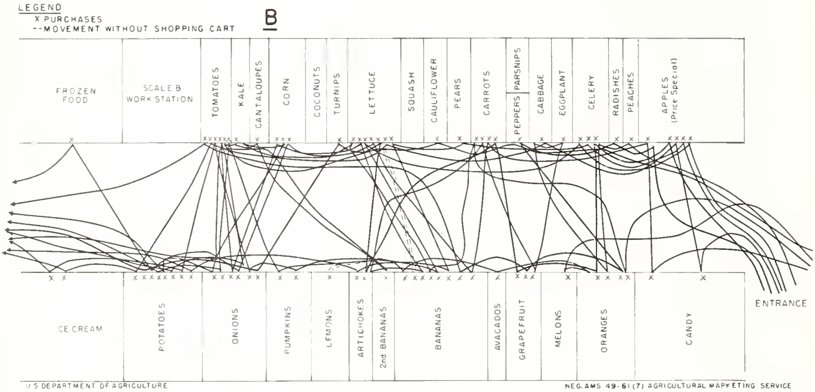
Produce end displays generally did not do as well as equal space on the side of the main aisle (table 10). 7/ End displays in five stores sold only 55 percent as much per front foot as major aisles, in spite of the fact the end displays were open to customers both on the end and on the sides.

6/ Prepared by Purdue University Retailer Education Staff, Eric C. Oesterle in charge.

7/ Research by Nick Havas and Hugh M. Smith, as reported in "Customer Shopping Patterns in Retail Food Stores," AMS-400, Agr. Mktg. Serv., U. S. Dept. Agr., and "Building Store Volume--How to Increase Customer Count" (speech, by Hugh M. Smith, at Manhattan, Kans., food retailers conference, Oct. 4, 1960) tends to confirm findings reported here, since end display sales were usually less per square foot than sales from the regular displays.



Before rearrangement of displays.



After rearrangement.

Figure 9.--Customer traffic patterns in the produce department of a retail food store before and after rearrangement of produce display locations.

End displays at the front of the store were frequently "too soon" for the customers on entering the store, and were passed before the customers stopped to consider what they wished to purchase. Customers who did shop this end often returned up the aisle to do so (fig. 2). Often wall displays drew the customer away from the first end (fig. 1).

Ends at the center split in the gondola benefited from the bounce pattern of shopping and from shoppers looking for an "escape" from the produce aisle. However, it was noted that many of the purchases on these ends were from the produce aisle side (fig. 1).

Ends at the back of the department were missed most often because of their position behind the customer as she passed (figs. 1 and 2). Ends on multiple gondolas sold slightly better, possibly because their position is often on the sides of aisles with fairly heavy through traffic (fig. 4).

End displays may serve other purposes than sales in a store's merchandising scheme. No attempt was made to evaluate these other uses.

Table 10.--Customer produce purchases per front food for end displays compared to regular displays in 5 stores

Store and type of gondola	Purchases per 100 customers per lineal front foot		
	End displays 1/	Major aisles 1/	Proportion end sales are of aisle sales
	Purchases	Purchases	Percent
A--Single gondola-2 ends....	1.18	1.85	63.8
B--Split gondola-4 ends.....	.41	1.14	36.0
C--Split gondola-4 ends.....	.85	1.50	56.7
D--Split gondola-4 ends.....	.67	1.52	44.1
E--Multiple gondolas-6 ends 2/...............	.80	1.09	73.4
Average.....................	.78	1.42	54.9

1/ Items displayed were vegetables, fruit, and wet rack items. On the ends, these were often favorably priced and in season. Ends were measured on one dimension only, the width across the end.

2/ This store had no wall displays.

Use of Islands and Extensions

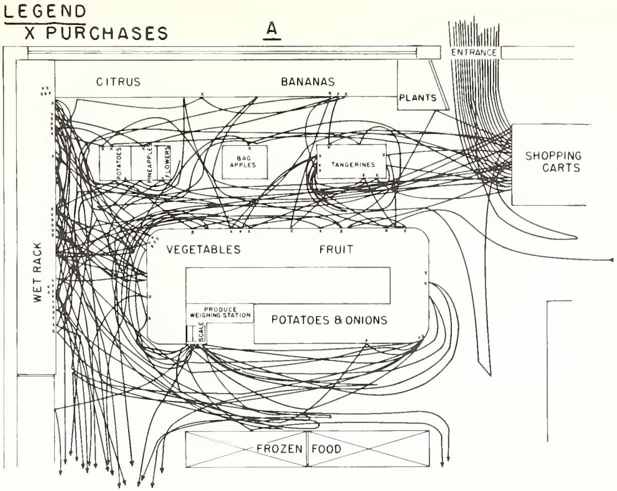
In many produce operations there is a tendency to build special displays in the center of aisles. These usually consist of small tables or piles of boxes, decorated with paper, on which merchandise is displayed. Very often the aisles were designed to permit traffic to flow freely, but with island displays in the aisle, congestion was created. These islands, when pushed too closely together, tend to create two secondary aisles, dividing traffic.

In several stores, traffic studies were conducted with and without islands in the major traffic aisle. In store A (table 11), islands were maintained about 4 feet apart. Sales decreased with islands, even though the islands increased the counter display area by 13.4 percent. The traffic pattern indicated that only 24.1 percent of the customers entered both aisles formed by the islands (fig. 10). This store, which had an L-shaped department, tended to direct the customers into the lefthand aisle. Congestion was undoubtedly a major factor, as sales on Tuesday, a light day, were 5.8 percent higher without islands and on Friday, a heavy day, were 19.6 percent higher.

Four other stores (B through E) were tested. These had similar straight departments with long aisles. In these stores, a minimum distance of 12 feet between islands was maintained. There was an increase in the number of shoppers who shopped one side only, but when islands were used, sales results varied depending on the width of the aisles. Sales were reduced or held constant in stores in which passageways were 4 feet or less. Sales increased in stores with passageways wider than 4 feet. In some instances, islands served to create cross traffic. The islands seemed to draw some customers across the aisle; however, customers still tended to shop the aisle on only one side of the island. The results in store C, where sales increased in slack periods and decreased in busier periods, again seemed to indicate that congestion plays a major part in reducing sales.

In an attempt to evaluate a produce display layout that had the advantages of island displays without their disadvantages, tests were run with the equivalent of the island displays (units 27 x 54 inches) located against the counters on opposite sides of the aisle in staggered positions (fig. 11). These are referred to as alternating extensions. Sales of produce, and produce shopping time per customer, were measured in the same stores by alternating clear aisles with the two methods of using the table displays, part of the time as island displays and part of the time as extension displays. Results of this experiment in four stores show that, in all but the narrowest aisles, during the time the tables were used as extensions the sales per customer were higher than when tables were used as islands or when the aisles were left clear (table 11). In the store with the narrowest aisle, this situation was reversed, with highest sales when the aisle was clear.

This table also indicates when the aisles were clear stores with the narrowest aisles had the greatest percent of customers who shopped both sides of the aisle. Alternate extensions apparently helped the wider aisle stores to increase shopping of both sides except where congestion became a problem as in store B.



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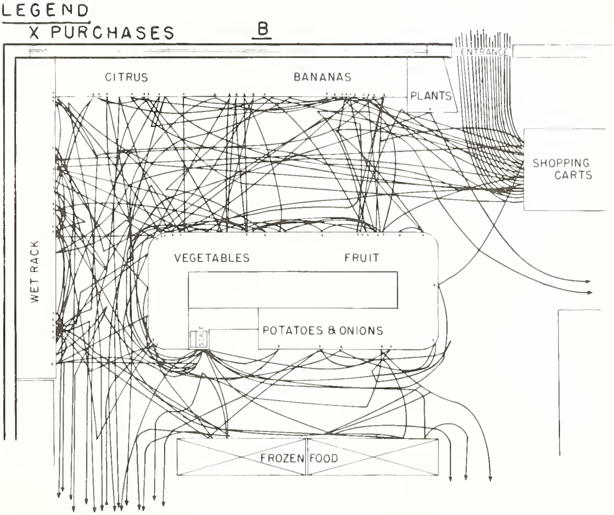
With islands.



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Without islands.

Figure 10.--Customer traffic patterns in the produce department of a retail food store with and without island displays in the aisle.

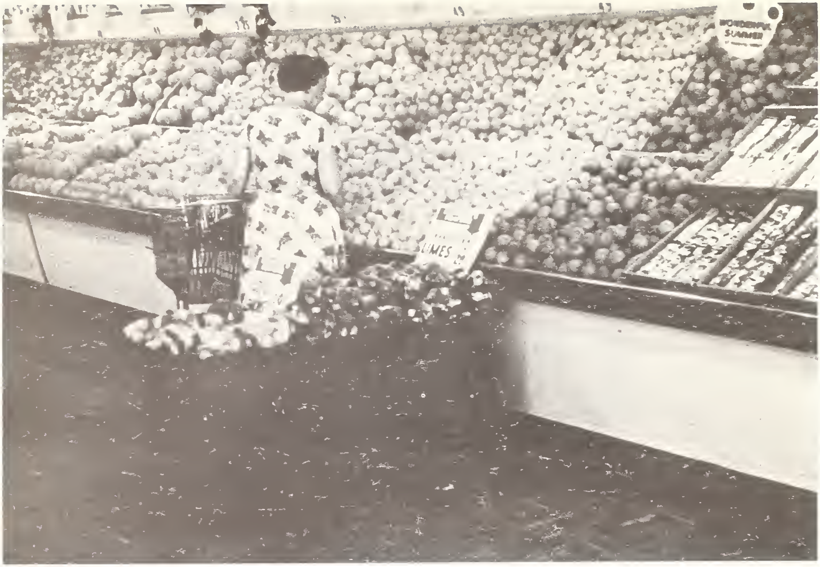

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Figure 11.--Type of counter extension displays used in testing alternate extensions of produce department displays.

Customers who normally went straight through the aisle were encouraged by the alternating extensions arrangement to start shopping produce (fig. 12). The percentage of shoppers who shopped one side only was reduced. Sales on the alternate extensions were slightly less than on islands, but when these sales were combined with those from duplicate displays of the same item in the regular displays the totals were equally as good for island displays and for extensions.[8] the total sales per customer from other displays increased and congestion was reduced. Sales increases were noted particularly across the aisle from the extension displays.

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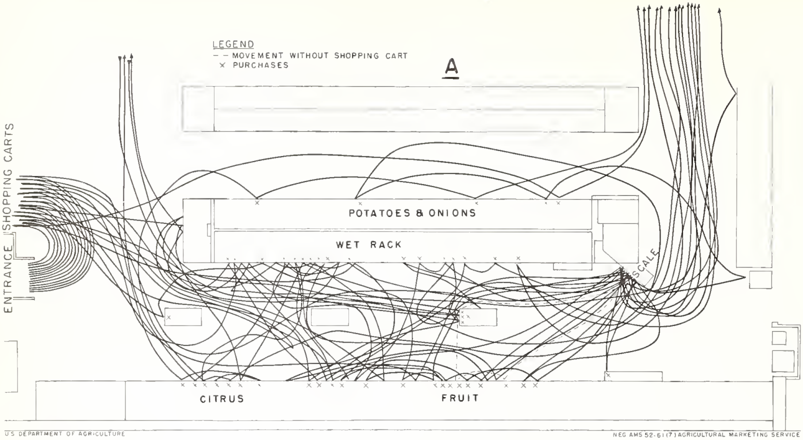
[8] In all cases duplicate displays were maintained on the regular counter as well as on the islands or extensions.

Table 11.--Comparison of purchases and time per customer in produce departments, with clear aisles, islands, and alternate extensions, 5 supermarkets

Store	Narrowest aisle width	Distance between islands	Purchases per customer		Time per customer		Total front feet of selling space	Customers shopping both sides
			Early in week	Late in week	Early in week	Late in week		
Without islands	Feet	Feet	Number	Number	Minutes	Minutes	Feet	Percent
A...........	10.9	-	2.57	3.85	2.07	3.25	104.2	40.8
B...........	7.2	-	2.17	2.92	2.25	3.02	117.9	60.0
C...........	8.2	-	1.47	2.44	1.32	2.10	114.8	52.5
D...........	11.7	-	2.29	2.86	3.04	3.47	172.5	50.0
E...........	12.5	-	2.26	2.64	4.02	4.22	177.8	28.3
With islands								
A...........	4.0	4	2.43	3.22	2.81	3.47	118.2	24.1
B...........	3.0	12	2.03	2.86	2.12	3.52	130.7	53.8
C...........	3.5	16	2.17	2.32	2.38	2.16	127.6	53.8
D...........	4.8	18	2.40	3.00	3.31	3.84	184.8	43.3
E...........	5.2	18	2.32	2.73	3.80	4.50	189.9	22.9
With alternate extensions								
A...........	-	-	-	-	-	-	-	-
B...........	4.7	16	1.73	2.70	2.50	3.01	130.7	63.8
C...........	5.8	18	2.23	3.06	2.17	2.99	127.6	62.5
D...........	7.2	18	2.37	3.70	3.42	4.73	184.8	63.3
E...........	8.0	18	2.37	2.75	3.92	4.36	189.9	34.6


LEGEND
– – MOVEMENT WITHOUT SHOPPING CART
× PURCHASES
A
SHOPPING CARTS
ENTRANCE
POTATOES & ONIONS
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FRUIT
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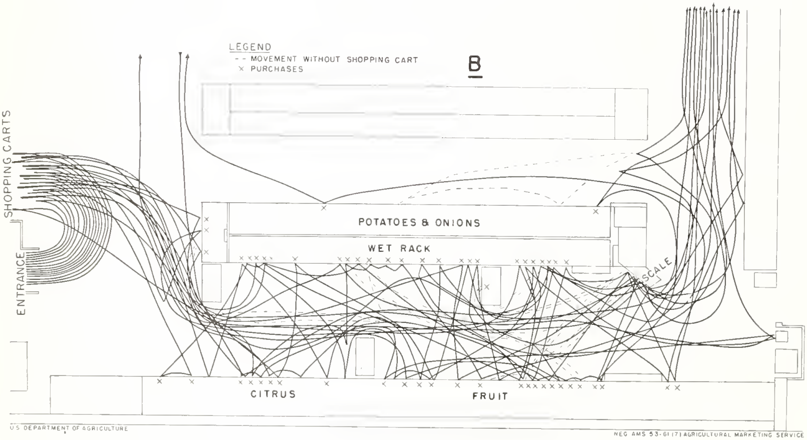
With islands.


LEGEND
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POTATOES & ONIONS
WET RACK
SCALE
CITRUS
FRUIT
U S DEPARTMENT OF AGRICULTURE
NEG AMS 53-61(7) AGRICULTURAL MARKETING SERVICE

With alternating extensions.

Figure 12.--Customer traffic patterns in the produce department of a retail food store using island displays in the center of the aisle and alternating extensions on opposite sides of the aisle.

The relative effectiveness of the two types of display was measured also by comparing sales per customer in four stores having island displays with four stores having alternate extension displays. All of these stores had major produce aisles of 11 feet or more in width. As shown in table 12 the purchases per customer in stores with alternate displays averaged 16 percent greater in number than those from the island displays.

Table 12.--Comparative produce sales per customer in 4 stores with island displays and 4 stores with alternate extension displays

Store pair [1]	Island display	Alternate extension display
	Purchases	Purchases
A...........................	3.14	3.35
B...........................	2.26	3.07
C...........................	2.36	2.80
D...........................	2.42	2.61
Average.....................	2.55	2.96

[1] Stores were paired for volume, location, and type of neighborhood.

These studies indicate that alternating extensions and, in some cases, islands can help create a favorable traffic pattern and increase produce sales in departments with relatively wide, uncongested aisles.

CUSTOMER SERVICE STATIONS

In many produce departments, a substantial part of the produce is displayed unpackaged and is weighed at a customer service station in the produce display area or at the checkout counter. Such a department is referred to in this report as a "bulk-type department." An analysis of sales in six retail food chains having bulk-type produce departments revealed that the average customer order consisted of 13.5 purchase units, of which 2.1 were produce. Of all produce units, 1.1 per customer, or half the purchases, were weighed at a customer service station or at the checkout counter. Studies in four stores with customer service stations showed that, on the average, 8 percent of produce department labor was used in providing customer service (table 13).

Table 13.--Percentage of time spent on various functions in service-type produce departments in 4 supermarkets

Function	Proportion of produce labor				Average of 4 stores
	Firm 1		Firm 2		
	Store A	Store B	Store C	Store D	
	Percent	Percent	Percent	Percent	Percent
Receiving and storage.	.7	1.2	2.9	4.2	2.2
Trimming..............	11.3	13.0	12.0	12.2	12.1
Walking...............	6.1	3.2	2.7	5.0	4.3
Display...............	15.6	17.0	16.6	20.1	17.3
Rehandle..............	15.9	11.7	13.6	8.4	12.4
Customer service......	8.8	7.5	7.7	8.1	8.0
Unavoidable delay.....	6.8	12.0	11.0	6.5	9.1
Packaging.............	12.8	12.5	15.7	15.1	14.0
Personal..............	7.1	6.2	5.3	5.3	6.0
Miscellaneous[1].......	14.9	15.7	12.5	15.1	14.6
Total.................	100.0	100.0	100.0	100.0	100.0

[1] Miscellaneous functions consisted of wet rack handling, cleanup and salvage, price changes, inventory, supervision, ordering, handling tags, signs, and supplies, and other. Produce was weighed in the produce department.

Unavoidable delay, which averaged 9.1 percent, occurred mainly at the customer service station. Miscellaneous functions were 14.6 percent, of which 3 percent were charged to the weighing station, so that approximately 20 percent of produce department labor was devoted to customer service.

Produce volume in the four stores ranged from $3,000 to $6,000 a week. While a study of these stores indicated that an average of less than one clerk out of a crew of four would be required for the service station, stores with volumes smaller than $3,000 probably would still require a full-time person at the weighing station, while stores with volumes in excess of $6,000 might not assign more than one person to weighing.

Equipment

The principal pieces of equipment required for the weighing function are a scale and a stapler. An analysis was made of two types of scales commonly used for produce weighing. As illustrated in figure 13, one scale has a high platform with a relatively low reading dial, while the other has a reading dial near the eye level and the platter lower, at a convenient working height. The low-platform scale took .068 minute per package compared with .078 minute for the high-platform scale (table 14).

Table 14.--Comparative time requirements to weigh produce on high- and low-platform scales

Time study element	Low platform	High platform
	Minutes	Minutes
Position bag on scale..................	.023	.023
Check contents of bag..................	.012	.012
Weigh..................................	.012	.018
Remove bag from scale..................	.021	.025
Total time per bag to weigh............	.068	.078

The saving of .010 minute per unit weighed in a department handling 4,000 produce items per week represents a year's savings of $62.40.

Produce bags customarily are stapled with a hand-operated stapler, although in some instances a foot-operated stapler is used. The latter has the advantage of allowing the operator to use both hands in closing the bag. Two types of automatic staplers were tested. In each instance, the folded edge of the bag was inserted in the jaw of the stapler and engaged a micro switch. This switch activated a solenoid which depressed the stapler head. The automatic staplers saved .011 minute per package--a saving particularly significant during the peak sales periods.

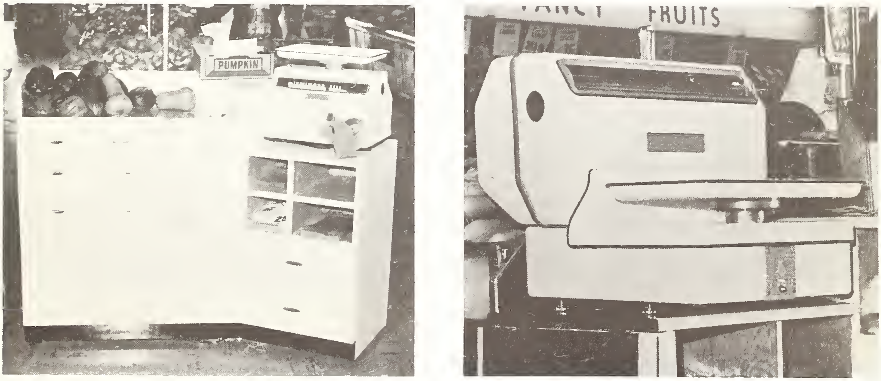

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Figure 13.--High and low platform scales used for weighing produce at customer service stations.

Usually the customer hands the produce package to be weighed to the clerk or places it on the scale platter. Occasionally the attendant has to step out of the customer service station to obtain the package for weighing or must wait for the customer to hand him the package. A shelf between the operator and the customer eliminated most of the delay for this operation. Time saved was .013 minute per package.

Design of Improved Stations

From the foregoing equipment studies and the application of engineering layout principles, recommendations were developed for the design and location of customer service stations.

1. Locate the station at the end of the typical produce department shopping route. When the station is in the center of the produce display area, especially when in the center of an island, there is a tendency for the customer to want each individual produce purchase weighed immediately upon making the selection. It requires more time to weigh three packages at three different times than three at the same time.

2. Locate the weighing station so customers will not block either aisle or a display. If the station is in an aisle, the aisle should be wide enough to accommodate the station and customer shopping carts plus room for passage of other customers.

3. Provide for a fixed workplace with the scale in one location. This eliminates the travel of the clerk from customer to customer or scale to scale, and permits him to serve more customers.

4. Eliminate barriers between customer and scale. If shopping carts or boxes block the customer from the scale, the clerk has to move to the customer to obtain the package and back to the customer with the weighed and priced package. If the customer is busy either when the clerk is ready to obtain or return the package to the shopping cart, the clerk is forced to leave the weighing station. It should be possible for the shopping cart to be parked adjacent to the service counter. The customer should be able to read the scale as her package is being weighed. Angled reading devices are available for most scales.

5. Provide a shelf beside the scale to hold packages. Many customers walk away from the scale to do more shopping while their merchandise is being weighed. The shelf permits the operator to dispose of the package and to serve the next customer. Some customers place a package on the shelf while another package is being weighed.

6. Work surface and scale platter should be at a convenient height, between 36 and 39 inches from the floor, with the scale dial above the platter and corrected for parallax. This keeps the operator's hands at a comfortable level and does not obstruct his view of the dial.

7. Locate tools, materials, and necessary equipment close to or directly in front of the operator, with tools pre-positioned whenever possible. The automatic stapler and tape dispenser should be in fixed positions. There should be definite and fixed places for all tools and materials. The pencil or pen for pricing the bags should be in a holder at the scale. Extra bags for use when customers bring unbagged items in their hands should be located near the scale and readily accessible. There should be a waste can at the station.

8. Provide a workspace for odd jobs. Due to the relatively small amount of of time required for serving the customer, there is considerable idle time unless jobs are provided which the clerk can do between customers. The work station should provide space for performing these jobs. Some of the jobs that can be done at the weighing station are:

a. Keep the department orderly to maintain attractive displays, and keep the floor clean.

b. Make price changes, prepare and clean signs, and prepare price tags of various kinds.

c. Bag or tray-pack small-lot items, such as lemons, small white onions, plums, parsley, cherries, nuts, and tangerines.

d. Maintain specialized displays of such items as plants and flowers, or operate special equipment such as a juice machine.

There are limitations on the types of work that can be performed at the weighing station. If the operator is a girl, jobs involving heavy lifting, such as packaging of potatoes and onions, should not be performed at the weighing station. Jobs which create disorder or interfere with the functions of the station should be performed elsewhere.

On the basis of the foregoing recommendations a basic customer service counter was designed (fig. 14). The basic design was modified somewhat to adapt to different types of installations.9/ Whenever possible, the station is placed in this design so that the attendant can see the entire department and face the customers who are being waited on. The station is located at the end of the produce shopping route or, when this is not possible, at the end of the display of items which require weighing. The scale is positioned adjacent to the aisle, to minimize the passing of packages from shopping cart to scale and return. A small shelf is between the scale and the customer. The automatic stapler is on the right of the scale. In this position, it does not interfere with the movement of packages from customer to scale. The normal procedure after weighing is to staple the bag and then price it.

9/ For construction details of customer service stations, see appendix, fig. 21.

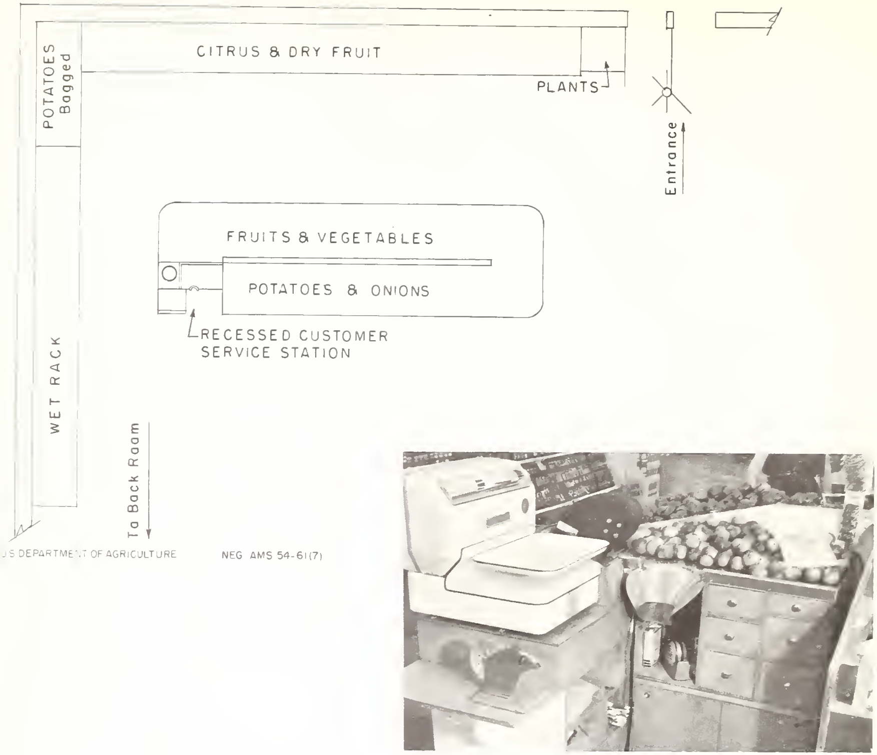

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Figure 14.--Improved customer service station built into corner of produce display counter.

Each of these work station designs includes a work surface, to the right and at a 90° or 45° angle from the scale, for tray-packaging or bagging produce. This surface can be either metal or fiberglass. The work surface is essential to utilize the operator's delay time between customers, but if it is unsightly or piled with trash it may create an unfavorable impression on customers.

Incorporated in the work surface is a bagging chute to be used for bagging produce (fig. 15).[10] When filling polyethylene bags the operator slides produce into the bag with the right hand via the chute while the left hand holds the bag on the chute. If the bag is to be weighed, it is placed on the scale and the weight obtained. It is then closed on the tape closing device.

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[10] Compared with hand filling in polyethylene bags, the bagging chute saves $1.75 in labor per 1,000 bags filled. Shaffer, P., Anderson, D. L., Wischkaemper, T. F. P., and Karitas, J., Packaging and Price-Marking Produce in Retail Food Stores, Mktg. Res. Rept. No. 278, Oct. 1958, p. 34, U. S. Dept. Agr.

An electrical outlet for a hand iron is located on the right-hand side of the packaging area. Extra bags are stored under the scale for items which must be bagged. Space is provided under the packaging area for several sizes of polyethylene bags. Two drawers are incorporated for storage of price tags, commodity identification inserts, and other pricing material. Also included in the packaging station is storage space for cleaning materials, extra staples, pens, and labels or tags. To the right of the scale is a hole for the disposal of trash into a container, concealed under the counter and accessible through a door. A sign over the scale indicates to the customer the location of the weighing station.

In another design for a customer service station, only the scale extends into the aisle (fig. 15). In this installation, less display space is lost and the location of the scale tends to encourage the customers to line up in the aisle away from the display cases.[11/] The clerk is in the aisle but protected by the projecting scale.

If the aisles are wide, the produce weighing station can be located in the aisle, but at the end of the produce shopping route (fig. 16). This eliminates the necessity of cutting out a section of the display. This type of counter, similar in design to the previously mentioned counter, can be used with a large island-type display fixture or with a series of dump display tables.

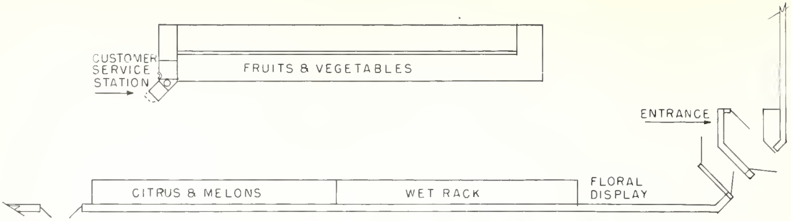
Regardless of where the service counter is located in the department, it is important that it be situated so as to avoid traffic bottlenecks and so that the attendant has a fixed workplace.

Results of Installing Improved Stations in Two Stores

Improved customer service stations were installed and tested in two stores. As shown in table 15, standard time per package for weighing and price-marking was reduced 43 percent in store A and 20 percent in store B. When the clerk handled all of the customer purchases at one time, there were fewer delays, and this, combined with the improved work station, increased the productivity of the packaging operations.

Increased efficiency freed the clerks to spend more time on such work as maintaining displays, prepackaging produce at the station, marking price tags, and record keeping.

[11/] For construction details, see appendix, fig. 22.



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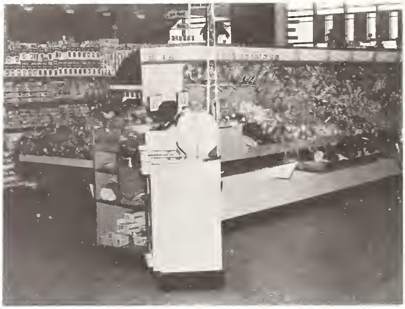

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Figure 15.--Improved customer service station with angled scale extending into the aisle.

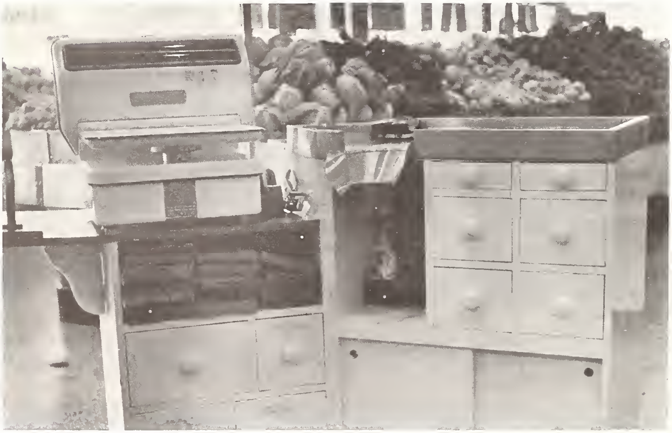

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Figure 16.--Improved customer service station located in an aisle.

Table 15.--Standard time per package for produce weighing and price-marking at the customer service counter in 2 stores, before and after improvements

Operation	Store A		Store B	
	Conventional	Improved	Conventional	Improved
	Min./pkg.	Min./pkg.	Min./pkg.	Min./pkg.
Weigh, price, and staple bag	0.222	0.154	0.206	0.170
Other elements relating to serving customer	.057	.090	.088	.083
Delays inherent in the operation	.215	.036	.091	.055
Total time per package	.494	.280	.385	.308
Personal and fatigue allowance, 15 percent	.074	.042	.058	.046
Standard time per package	.568	.322	.443	.354
Hours per week to weigh produce 1/	72.9	41.3	56.7	45.5

1/ Based on 7,000 orders with an average of 1.1 produce items weighed per order.

The customer service station in store A, before improvements, was in an island-type display fixture. The aisle and work area allocated to the weighing function occupied 56.7 square feet. Three high-platform scales were used. The improved weighing station had a low-platform scale and automatic stapler, and used 14.3 square feet.

Before improvements, store B had two weighing stations in the main aisle. Each station had a high-platform scale mounted on a table. When any work, other than produce weighing, was performed, shopping carts were positioned on each side of the scale. The area used by the two produce weighing stations was approximately 40 square feet. In the improved operation, a low-platform scale and stapler were mounted on a combination weighing and miscellaneous packaging table. Total investment for equipment in the improved installations was little different from the conventional, but the improved equipment freed valuable space in the produce department and lowered the overhead cost per produce order handled.

The improved customer service station saved $3,302 a year in store A and $1,232 in store B, compared to the conventional operation (table 16). Savings per customer order were .91 and .34 cent, respectively.

Table 16.--Labor, equipment, and space costs for produce weighing in 2 stores before and after improvements

Item	Store A		Store B	
	Conventional	Improved	Conventional	Improved
	Dollars/ year	Dollars/ year	Dollars/ year	Dollars/ year
Equipment[1] --Scales...........	2/ 67.50	3/ 25.00	2/ 45.00	3/ 25.00
Scale stand......	1.00	--	5.00	--
Stapler	2.50	9.50	2.50	9.50
Weigh station....	--	15.00	--	15.00
Total equipment...............	71.00	49.50	52.50	49.50
Space--$7.05 per sq. ft. sales area.................	399.74	100.82	282.00	105.75
Labor.........................	6,843.20	3,858.40	5,314.40	4,258.80
Total per year................	7,313.94	4,008.72	5,648.90	4,414.05
	Cents/ order 4/	Cents/ order 4/	Cents/ order 4/	Cents/ order 4/
Equipment.....................	0.02	0.01	0.01	0.01
Space.........................	0.11	0.03	0.08	0.03
Labor[5].......................	1.88	1.06	1.46	1.17
Standard time in minute per order 6/................	(0.625)	(0.354)	(0.487)	(0.389)
Total cost per order, cents...	2.01	1.10	1.55	1.21

1/ All equipment depreciation based on 10-year life.

2/ @ $225 cost per scale, 3 scales for "A" and 2 for "B."

3/ @ $250 cost per scale, 1 scale for "A" and 1 for "B."

4/ Assuming 364,000 orders per year, $35,000 weekly volume, with an average sale of $5.00 per customer order.

5/ Based on an average hourly rate of $1.80.

6/ 1.1 weighed items of produce per customer order.

WEIGHING PRODUCE AT THE CHECKOUT COUNTER

There are many methods of weighing produce at the checkout counter, each associated with different types of counters. Several of the two basic types of checkout counters used in weighing produce were studied and evaluated.

Alternative Checkout Counters for Weighing Produce

The most typical basic counter for weighing produce at the checkout is the commonly designated split "L." With this counter, the cashier removes the items from the shopping cart and places them on the counter with her left hand, and simultaneously records the sale with her right hand. For efficient operation with this counter, the cash register and the counter must be convenient to the cashier and there must be a scale for produce weighing. In one design (model A), the shopping cart is positioned for unloading between the register and the counter (fig. 17). The scale is recessed at the end of the counter and the register is high enough for the cart to pass under. The shopping cart can be removed to reduce the reach from the cart to the counter. The model A counter provides a workplace where the bending and reaching involved in working out of a shopping cart is minimized. The customer no longer has to bother with the cart. On the other hand, the register is too high for efficient operation and the scale is rather inconveniently located.

In another split L-type counter (model B) the scale is located behind the cashier as she faces the register (fig. 18). Here the cashier turns around to weigh produce items. In this counter, the scale is more accessible than in model A, but the operator must pick up the package to be weighed, turn and place it on the scale, wait for the scale to balance, place weighed produce on a belt, and turn around to record the sale. Reaching into the shopping cart is most fatiguing, and disposal of the cart is a problem. The register is fairly well located and the counter is compact.

In the split "L" checkout (model C), a scale is flush-mounted in the counter, and the shopping cart is positioned at the end of the counter to the left of the register (table 17). The scale is very conveniently located but there are the same disadvantages as in model B. Furthermore, it is not possible to bypass the scale unless the item is lifted over. This causes a rather long reach from shopping cart to the area on the counter top beyond the scale.

In the second basic type of checkout counter, the order is placed on the counter before it is recorded. The shopping cart is unloaded either by the customer or by checkout personnel. This relieves the cashier of considerable work and makes possible a more simplified layout, since it is not necessary to place the shopping cart in the work area. In model D of this type of counter, the merchandise is placed on a revolving disc which moves it to the cashier (fig. 19). A low-platform scale is flush-mounted in the counter to the left of the cashier. There is ample space in front of the scale so "nonweigh" items can bypass the scale. The shopping cart passes through a special aisle and is controlled by the checker. This type of counter is wider and, therefore, requires a wider checkout area.

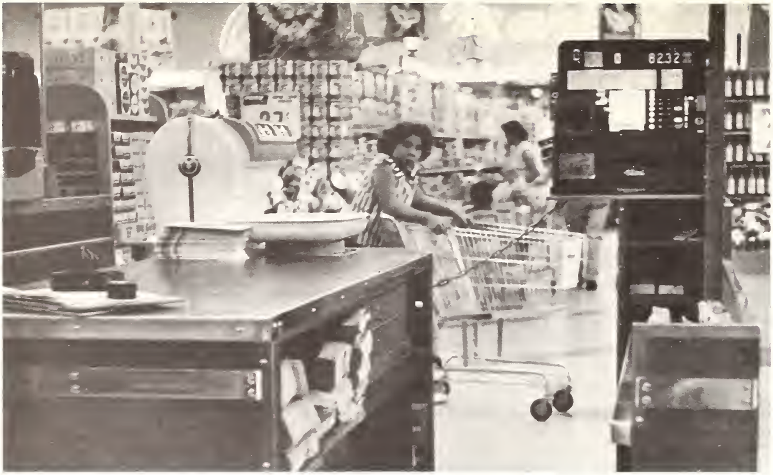

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Figure 17.--Model A split L-type checkout counter with raised register and scale to cashier's left.

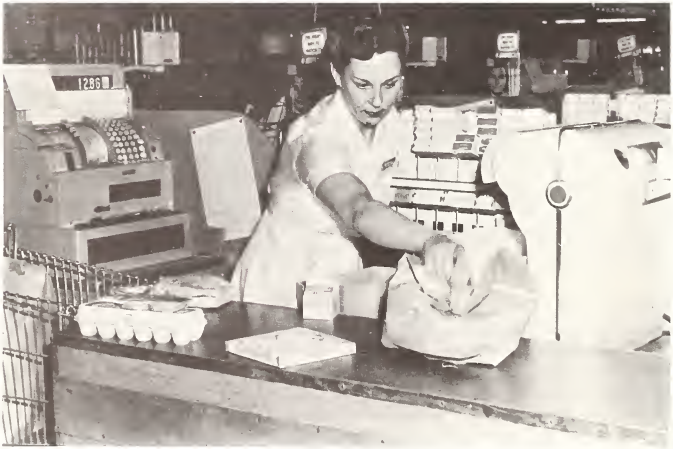

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Figure 18.--Model B split L-type checkout counter with scale behind the cashier.

Another location for the scale in the second basic counter design is on a bridge over the counter and to the left of the cash register. It can be mounted over a shuttle bar (push-pull) or belt-fed counter, with approximately the same time requirements for weighing and recording the sale. The bridge provides a convenient location for the scale without interfering with the flow of merchandise on the counter. A disadvantage is the lifting of items to be weighed. This can be minimized if one item is placed on the scale simultaneously with the removal of another. The bridge scale was incorporated also in the Redi-Chek (model E) counter (fig. 20). 12/ A well was built in this counter to the cashier's left so she could select items from the belt and place them in a sack in the well with her left hand, while the right hand recorded the sale. By combining the recording and bagging functions, one extra handling for each item was eliminated. When the ringup or recording was complete, the order was bagged and ready for the customer.

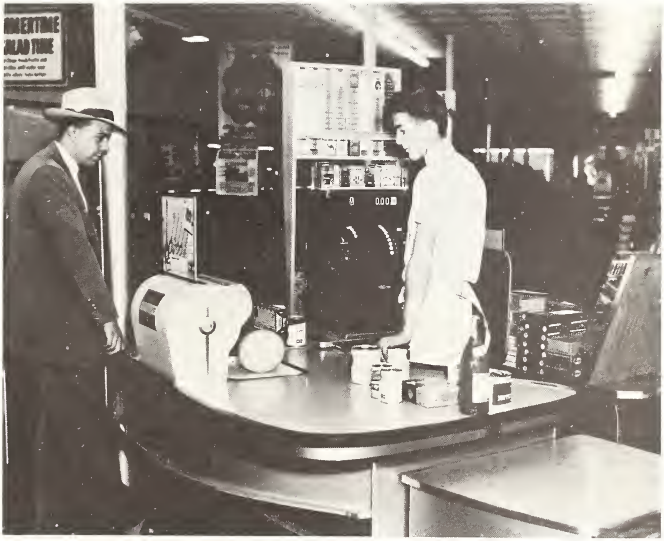

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Figure 19.--Model D--Disc-type checkout counter with recessed scale.

12/ See Harwell, E. M., and Shaffer, P., Agr. Inf. Bul. No. AIB-31, The Checkout Operation in Self-Service Retail Food Stores, p. 25. U. S. Dept. Agr.

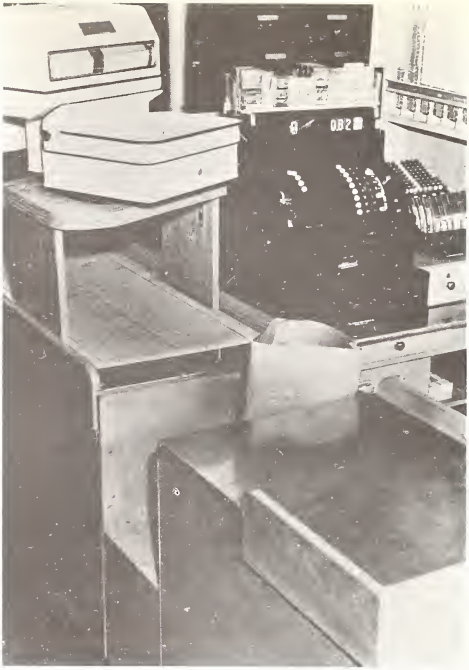

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Figure 20.--Model E, Redi-Chek checkout counter with bridge-mounted scale.

From the foregoing studies, several points can be made about the design and arrangement of checkout stations for effective weighing of produce.

1. Locate a low-platform scale at working level so the operator does not have to turn or reach to use the scale. Be sure the weight is visible to the customer. Angle reading devices are available for most scales.

2. Locate this scale so it does not interfere with the regular ringup operation and so the operator does not have to reach over the scale. Produce weighing is a minor part of checkout operations, and scales should not be located so as to delay the major operations.

3. Use a scale which has an easily read dial. Most modern service scales provide easy-to-read dials with little parallax and fairly complete price charts, and they need no manual adjustment to change price scales. However, these factors may be serious problems with old or obsolete scales.

4. Provide a supply of small bags for bagging produce items. Produce items may be wet or need additional protection, and special bags are often necessary.

5. Provide adequate price-chart information for the produce to be weighed. With many persons involved in pricing produce, price information at each checkout is necessary.

6. Use a register which eliminates presorting. A register with motorized commodity keys permits the operator to ring up items as they are presented to her.

Labor Requirements for Weighing Produce at the Checkout Counter

The time required to weigh a produce item at the checkout counter was determined by subtracting the average time to record a sale of any checkout item from the average total time to weigh and record the sale of a produce item. Time was added for the infrequent performance of certain tasks associated with produce weighing. These elements--"reweigh package," "check contents of bag," "change bag size," "talk to customer," and "clean scale"--add .011 minute per produce item weighed. In five retail food chains, the average customer purchased 13.5 items. 13/ Of this total, 2.1 items were produce, of which 1.1 items per customer were weighed.

Model E counter, with the scale on a platform and the ringup combined with bagging, was the lowest cost counter for produce weighing (including the miscellaneous irregular elements). This lower time (.044 minute per customer) is due to a combination of the scale location and the combining of the weighing, bagging, and recording (ringup) elements. This applies only when the checker works alone, as opposed to a checker-sacker combination.

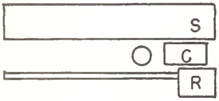
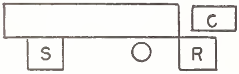
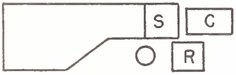
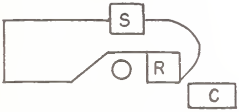
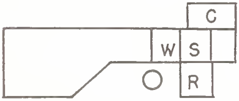
Among the more conventional checkout counters, the lowest cost produce weighing operation was in model D. Here the scale was conveniently located for weighing, yet did not interfere with the recording of other items. The most time was required for model A, because of the inconvenient scale location.

Labor requirements for checkout operations (produce and nonproduce) were developed for the five counters studied. The increased labor requirements due to weighing produce varied from 3.0 percent on the model E checkout counter to 6.3 percent on model A. According to industry sources, the typical supermarket had a weekly volume of $35,000 and 7,000 customers (at $5.00 per order). 14/ The additional man-hours per week required for weighing at the checkouts in a store with this volume varied from 5.1 on model E to 14.0 hours on model A (table 18).

13/ The 13.5 items represented 15.3 physical units.

14/ "The Super Market Industry Speaks - 1959." The Super Market Institute, Chicago, Ill.

Table 17.--Comparative labor requirements for weighing produce and recording the sale on alternative checkout counters

Model		Record sale per item	Record sale and weigh produce item 1/	Net time per item to weigh produce	Weigh time per customer 2/	Standard time per customer to weigh produce
		Min.	Min.	Min.	Min.	Min.
A.		.042	.137	.095	.104	.120
B.		.045	.106	.061	.067	.077
C.		.047	.094	.047	.052	.060
D.		.032	.076	.044	.048	.055
E.		.048	.083	.035	.038	.044

1/ This time includes miscellaneous weigh elements.
2/ Based on 1.1 weigh items per order.
Legend:
C=shopping cart; R=cash register; S=scale; W=sacking well. ○=checker.

Table 18.--Additional labor required per week at checkout for 5 different counters when produce is weighed at the checkout counter 1/

Counter	Standard time per order		Increased labor costs per order		Increased man-hours per week 2/
	Weigh	Nonweigh			
	Minutes	Minutes	Cents 3/	Percent	Hours
Model A	2.015	1.895	.36	6.3	14.0
Model B	2.019	1.942	.23	4.0	9.0
Model C	1.972	1.912	.18	3.1	7.0
Model D	1.734	1.679	.16	3.3	6.4
Model E	1.492	1.448	.14	3.0	5.1

1/ For additonal details, see appendix, table 21.
2/ Based on 7,000 orders per week.
3/ At $1.80 per hour.

The location of the scale usually has little effect on total checkout productivity, since the time per order to weigh produce (.044 to .120 minute) is low compared to total checkout time requirements. However, if the scale location interferes with the recording, bagging, or change-making operation, it may materially decrease overall checkout productivity.

Equipment and Space Requirements for Checkout Weighing

When produce is weighed at the checkout counter, several customer checking scales should be located in the produce department in addition to the scale at the checkout counter. Furthermore, the additional man-hours required at the checkout counter to weigh produce may necessitate more checkout counters and thus increase the cost for equipment and space. Assuming no change in the proficiency of the checkout operation, the increased cost for checkout requirements and space would be proportional to the increase in labor requirements for checkout weighing. This proportional cost is used here; however, in practice, a store would add either one checkout or additional labor to existing checkouts.

Stores with $35,000 weekly sales would require about 7 checkout counters.[15/] The additional equipment for produce weighing would vary from $287 on model E to $383 on model C (table 19).

Added checkout equipment for weighing produce requires a proportionate increase in space in the checkout area. The average counter occupies a space of 60 square feet (6 by 10 feet) plus the aisles in front and back of the counters. If the combined aisles are 13 feet long, each counter requires 6 by 23 feet, or 138 square feet. In one retail food chain, the charge per square foot is $7.05 per year. At this rate, the total cost of space per counter is $973 per year, or $6,811 for the seven checkout counters in a $35,000-per-week store. The annual cost of average additional space varies from $204 to $429 (table 19).

15/ Based on information from a survey by Progressive Grocer magazine, February 1959, pages 86-94.

Table 19.--Labor, equipment, and space costs for weighing produce on 5 types of checkout counters in a $35,000-per-week food store

Item	Model A	Model B	Model C	Model D	Model E
	Dollars	Dollars	Dollars	Dollars	Dollars
Equipment:					
Added checkout counter cost 1/...	2/ 18	3/ 35	4/ 77	4/ 77	5/ 18
Counter scales 1/................	6/ 175	6/ 175	7/ 210	6/ 175	6/ 175
Check-weigh scales 8/............	37	37	37	37	37
Additional equipment for produce 9/	94	61	59	62	57
Total additional equipment cost..	324	308	383	351	287
Space:					
Additional checkout area for produce 10/.....................	429	272	211	225	204
Labor:					
Additional labor costs to weigh produce @ $1.80 per hour........	1,310	837	655	582	510
Total equipment, space, and labor	2,063	1,417	1,249	1,158	1,001
Net cost per order 11/ cents.....	0.57	0.39	0.34	0.32	0.28

1/ Assuming $5,000 sales per counter on 7 stands depreciated over 10 years.
2/ $205 without scale mounting and $230 with.
3/ $230 without scale mounting and $280 with.
4/ $650 without scale mounting and $760 with.
5/ $800 without scale mounting and $825 with.
6/ $250 per scale.
7/ Self-locking platter, flush mounted scale @ $300 per scale.
8/ Check-weigh scales for customer convenience--4 @ $92.50 depreciated over 10 years.
9/ This is the additional equipment required for the added function of produce weighing at checkout. (See table 18, increased labor per order).
10/ This is the space for additional counters due to increased labor requirements (total space cost per year $6,811 for 7 counters).
11/ Based on 364,000 customer orders per year.

The estimated additional cost of produce weighing for a $35,000-per-week store would be $1,001 for model E (Redi-Chek) and $2,063 for the split-L counter (model A) (table 19). Assuming 364,000 orders per year, the additional cost per order varies from 0.28 cent to 0.57 cent for the respective models.

COMPARATIVE COSTS AND ADVANTAGES OF CUSTOMER SERVICE STATIONS VS. WEIGHING PRODUCE AT CHECKOUT

Increased efficiency in the produce weighing and price-marking functions is possible, whether the work is performed at a customer service station or at the checkout. Comparison is made here between the two basic methods when each has utilized efficient methods and equipment.

The labor charge for produce weighing at a customer service station is by far the dominant factor in a comparison of the two weighing systems (table 20). This is due to the additional work elements required: "Write price on bag" and "staple bag," plus the inherent delays in the operation. Labor for checkout weighing consists of placing the produce item on the scale and reading the amount of the sale. The only equipment for weighing at the customer service station is the scale, work station, and stapler. This compares with scales for each counter and the additional counter units required by the checkout weighing system. The improved customer service station requires a space of 14.3 square feet, compared with a total of 28 square feet which, on the average, must be added to the checkout area to handle a comparable volume ($35,000 per week) when produce weighing is performed there. With this size of store and with 364,000 orders per year (at $5.00 per customer order), the labor, equipment, and floor space costs of weighing produce at a customer station are $4,009 per year compared with $1,001 for checkout weighing.

Table 20.--Comparative costs per order for produce weighing at a customer service station and at checkout counter

Item	Improved customer service station	Checkout counter (Model E)
	Cents	Cents
Labor	1.06	.14
Equipment	.01	.08
Space	.03	.06
Total cost per order	1.10	.28
	Dollars	Dollars
Total cost per year for 364,000 orders and wage rate of $1.80 per hour	4,009	1,001

Advantages of Weighing Produce at Checkout

Principal advantages of weighing at the checkout counter include:

1. The customer has only one stop to make.

2. Less congestion occurs in the produce department; hence, there is faster shopping in that department.

3. Loss of produce clerk time due to "delays for customers" is greatly reduced in the produce department.

4. Labor is saved because the individual produce items are not physically priced and usually are not bagged.

5. The stapling of bags, which occurs in the customer service operation, is eliminated at the checkout counter.

6. Some space may be released for additional produce displays.

7. Scheduling of help in the produce department is greatly simplified.

8. Miscellaneous bagging, pricing, etc., which are typically performed at the service counter to utilize idle periods, can be performed more efficiently at workplaces in the backroom.

Advantages of Weighing Produce at Customer Service Station

Advantages of weighing produce at a customer service station include:

1. Equipment costs are less, and fewer checkouts are required.

2. One clerk specializing in produce pricing is less apt to make errors and is more concerned with the produce department's interests.

3. Checkout bottlenecks are reduced.

4. Some customer contact in the produce department is maintained.

5. The customer knows the exact price of the purchase in advance of checkout.

6. Produce is protected, at least in part, during the shopping tour.

7. Someone is on the floor in produce at all times to watch the department.

8. The customer can more readily identify purchase items with prices on sales slip.

All of these factors need to be taken into account in determining the system to be used. If a change is to be made, it is, of course, important that customers be fully informed in advance.

Another factor that must be considered is the size of the store. Larger markets can, by packaging or unit pricing selected items, maintain a fairly steady production load for the service station. Small stores, on the other hand, have a much more difficult time keeping personnel at the customer service station and have relatively fewer problems with checkout bottlenecks.

Finally, the more packaging that is done before the produce reaches the store, or is done at the store, the less concern there is with the weighing function.

PRINCIPLES OF LAYOUT FOR PRODUCE DEPARTMENT DISPLAY AND CUSTOMER SERVICE AREA

Principles were developed from studies of the produce display area that should be used in preparing produce layouts or rearranging the produce department. If they are properly applied, they can help determine correct floor space and display arrangement in order to obtain a low labor cost and maximum produce sales per customer.

1. Locate the produce department first in the store's shopping pattern. Displays can be inviting, and since most customers buy produce, the location serves to start the customer shopping. Also, produce is often one of the most profitable departments, and fresh produce sales often are preferred by the retailer over sales of canned or frozen foods.

2. Design the department so traffic moves in one direction. Congestion is created much quicker when there is two-way traffic. A wider aisle is required for traffic going in two directions.

3. Avoid secondary aisles. Most customers make only one trip through the produce department and, as a result, it is difficult to get a high percentage of customers to enter secondary aisles.

4. Keep produce displays back from entrances and exits. It was observed during these studies that customers tend to enter a store and move some distance before they start to shop. Any item near the entrance therefore may be bypassed by the customer. Displays near exits or checkouts may be bypassed or become congested.

5. Design aisle widths that will be adequate to handle average peak congestion periods. Space is needed for shopping. When customers get crowded, they become impatient and move on to other less crowded areas of the store. However, if too wide an aisle is allotted, the customers tend to shop only one side of the aisle. Space should be adequate to permit some stocking during heavy shopping periods. Allow space for the "average" peak, not the extreme.

6. Arrange the department to encourage "bounce" traffic. When a customer turns from a display, she usually gets a good view of merchandise across

the aisle, and is encouraged to cross and shop. Such cross-shopping exposes the customer to the whole department as she moves through.

7. Use specials to pull customers into corners and "dead" sales areas. Slow-turnover areas develop in any layout. Often these can be determined ahead of time and special displays prepared to move customers to these areas.

8. Arrange displays to encourage complete shopping of the department. Department arrangements that exposed the customer to all the produce displayed returned the greatest sales. Try to surround the customer with produce rather than aisles, and limit the "escape" openings that permit bypassing the department.

9. Locate backrooms close to sales areas to minimize clerk travel. The major part of clerk travel in produce departments is from backroom to displays, and therefore backrooms that are distant from displays multiply this travel and frequently increase congestion on the sales floor. Clerk traffic should move to the display floor in a way that minimizes crossing customer paths. In some stores, where service aisles behind the displays are provided and the major aisle is narrow, displays can be moved back and one major aisle provided which will permit adequate servicing and still reduce customer congestion.

10. Locate the service station, if used, at the end of the produce shopping route. This prevents backtracking by the customer and encourages the customer to have all of her produce weighed at one time.

11. Locate the customer service station so customers will not block either an aisle or a display. If the station is located on an aisle, the aisle should be wide enough to accommodate customers waiting at the station plus other customers who wish to pass by.

APPENDIX

Methods Used to Plot Customer Traffic

Plots of customer traffic were made by an observer stationed in an obscure position in or near the produce department. Random selection of customers was made by choosing the next person entering the store or department after the last one observed departed. The observations and plots were limited to one customer at a time. The path the customer followed in shopping the departments was traced on a sheet previously imprinted with the approximate department layout and display locations. A notation was made of each item purchased, and the time the customer spent in the department was recorded with a stopwatch. When customers returned to the department, this was recorded and added to the original plot. Customer identification with shopping carts was maintained by recording paths as solid lines when customers moved with carts and as dotted lines when customers left the carts. Additional information was sometimes collected on entrances and exits and, in some cases, total customer time in the store was sampled.

At the end of each observation period, customer tracks from individual sheets were transposed to a correctly scaled master sheet, giving a composite plot of the paths and purchases of a number of customers superimposed on each other. Individual shopping times and item purchases were totaled to obtain averages for the period. The total number of purchases and total shopping time for the various periods were averaged and compared to arrive at percentages.

Customers were tracked in each of two different time periods. Some of the earliest studies of produce departments, taken at regular intervals throughout the week, indicated that major differences in customer traffic patterns occurred during slack and busy periods. Therefore, time periods used were slack periods on Mondays, Tuesdays, and Wednesdays, and peak traffic periods on Thursdays, Fridays, and Saturdays. Experience in other studies determined the approximate minimum number of customer plots that would provide adequate data. If the assortment, quality, and prices of items offered for sale in the produce department remained essentially unchanged, a minimum of 50 customers for each slack or busy period was recorded. However, it was found that 20 to 30 customers represented the best composite plot for visual analysis. More customer paths created confused lines.

Experiments were made in adapting a motion and time study technique called "Memomotion" 16/ to the analysis of customer shopping patterns. Memomotion is the name given to the use of motion pictures taken at unusually slow speeds for recording and analyzing occurrences over an extended period of time.

A specially designed motor drive with reduction gearing is required to adapt a movie camera for this type of work. A camera speed of 50 frames per minute has been found to be best for customer traffic study. However, some difficulties were encountered in trying to make plots from films, due to the limitations of the camera "eye." The principal advantages of this method of data collection for customer traffic research are:

1. A permanent record of the data is made.
2. The elapsed time of any segment of the actions recorded can be measured.
3. Data can be obtained on many customers simultaneously.
4. The camera shows the interrelation of one customer to another and of employees working or traveling in the sales area.
5. The camera is less likely than an observer to draw the attention of customers and influence their shopping behavior (usually the camera can be hidden).
6. The film can be used to show specific patterns by running it at normal projection speeds.

The principal disadvantages are:

1. Blind spots may occur when the view of counters is blocked by customers. This gives less accurate data on purchases.
2. The camera is not as well adapted to all situations as is the plotting board technique because of camera and lens angle limitations.

16/ As described and discussed by M. E. Mundel, Motion and Time study, 2nd Edition, 1955, chapter 14.

Table 21.--Production standards for 5 types of checkout counters with and without produce weighing[1]

Element description	Split "L"						Disc type		Redi-Chek	
	Model A		Model B		Model C		Model D		Model E	
	Without	With	Without	With	Without	With	Without	With	Without	With
	Min.	Min.	Min.	Min.	Min.	Min.	Min.	Min.	Min.	Min.
Record sale (13.5 items)	.567	.671	.608	.675	.635	.687	.432	.480	.648	.686
Total and add tax.......	.074	.074	.074	.074	.074	.074	.074	.074	.074	.074
Make change............	.238	.238	.238	.238	.238	.238	.238	.238	.238	.238
Bag....................	.576	.576	.576	.576	.576	.576	.576	.576	-	-
Misc. elements..........	.140	.140	.140	.140	.140	.140	.140	.140	.146	.146
Position shopping cart..	.012	.012	.012	.012	-	-	-	-	-	-
Dispose of shopping cart	.041	.041	.041	.041	-	-	-	-	-	-
Remove bag from well....	-	-	-	-	-	-	-	-	.037	.037
Position bag in well....	-	-	-	-	-	-	-	-	.116	.116
Total time per order....	1.648	1.752	1.689	1.756	1.663	1.715	1.460	1.508	1.259	1.297
15 percent personal and fatigue allowance.....	.247	.263	.253	.263	.249	.257	.219	.226	.189	.195
Standard time in minutes per order	1.895	2.015	1.942	2.019	1.912	1.972	1.679	1.734	1.448	1.492
Cost per order (@ $1.80 per hour)............	5.68	6.04	5.83	6.06	5.74	5.92	5.04	5.20	4.34	4.48
Increased labor requirements for produce weighing at checkout, percent...............	6.3		4.0		3.1		3.3		3.0	
Additional hours per week (@ 7,000 orders).	14.0		9.0		7.0		6.4		5.1	

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[1] Data on all counters are for one checker working alone. The average order is 13.5 ringup items.

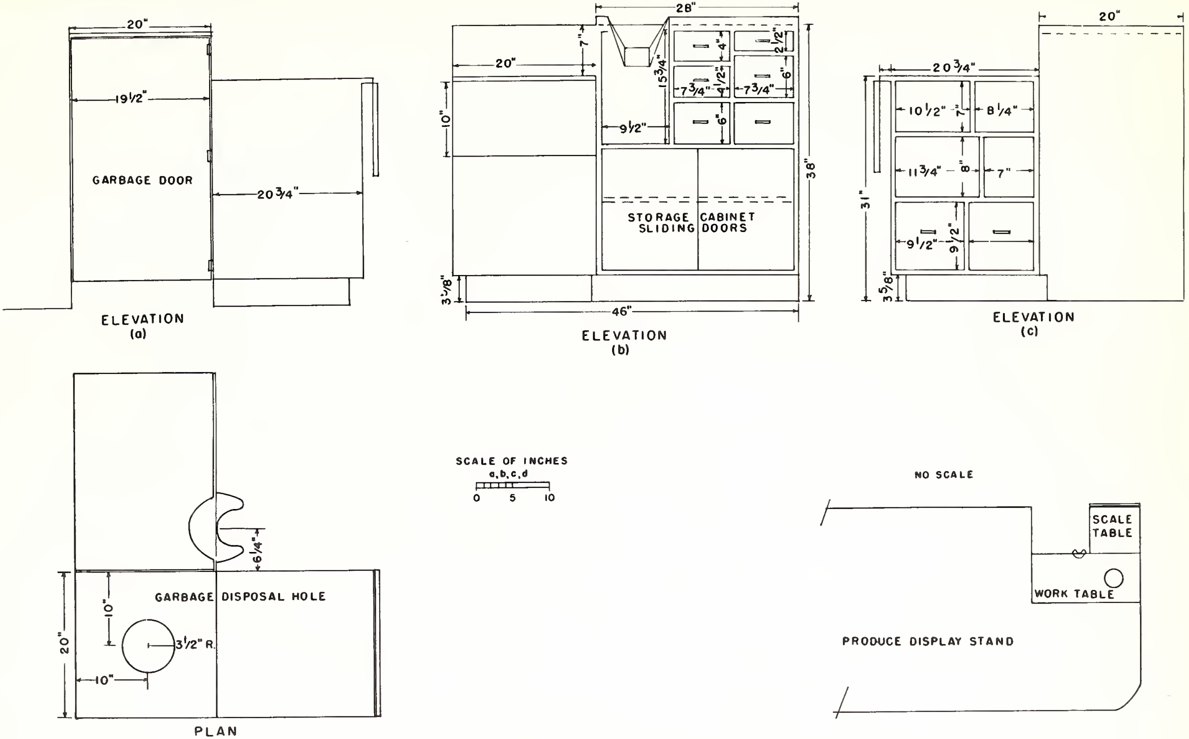

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Figure 21.--Construction details of improved customer service station for recessed mounting in display fixture.

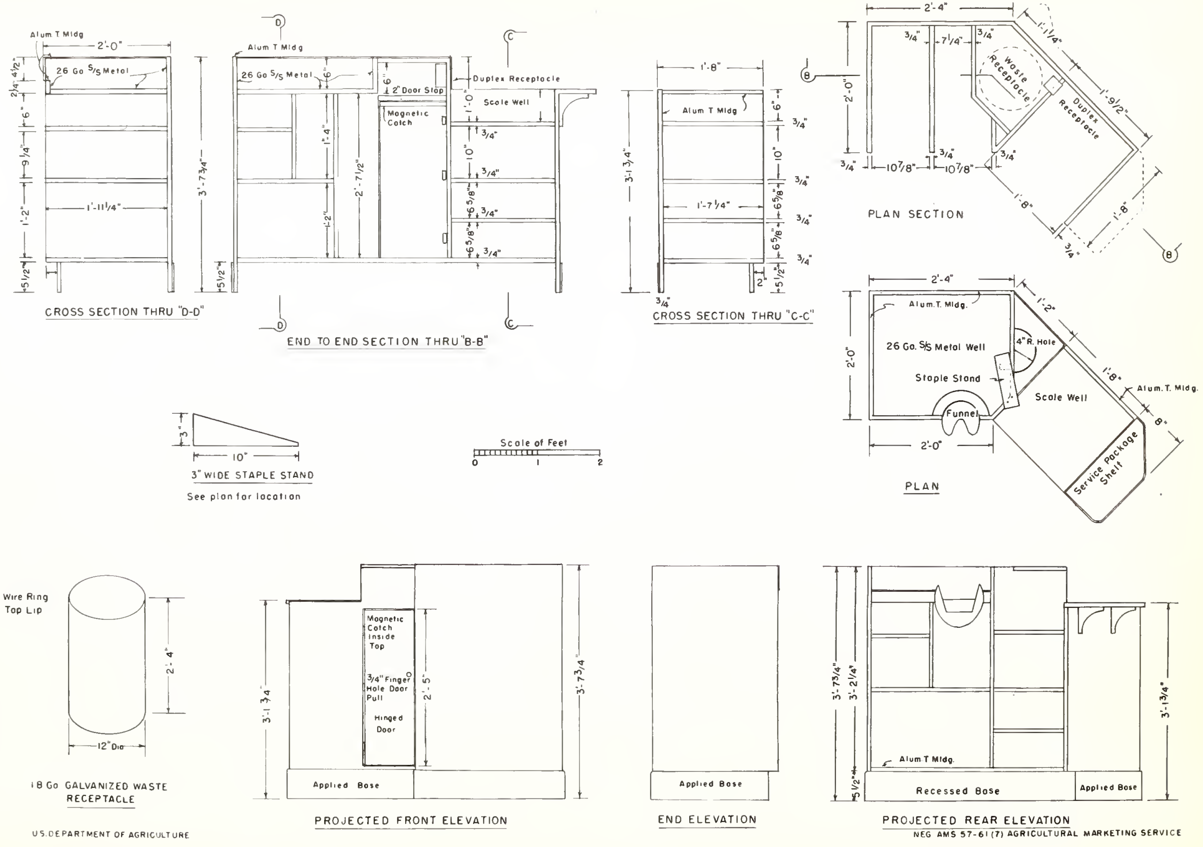

Figure 22.--Construction details of improved customer service station with angled scale stand.

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